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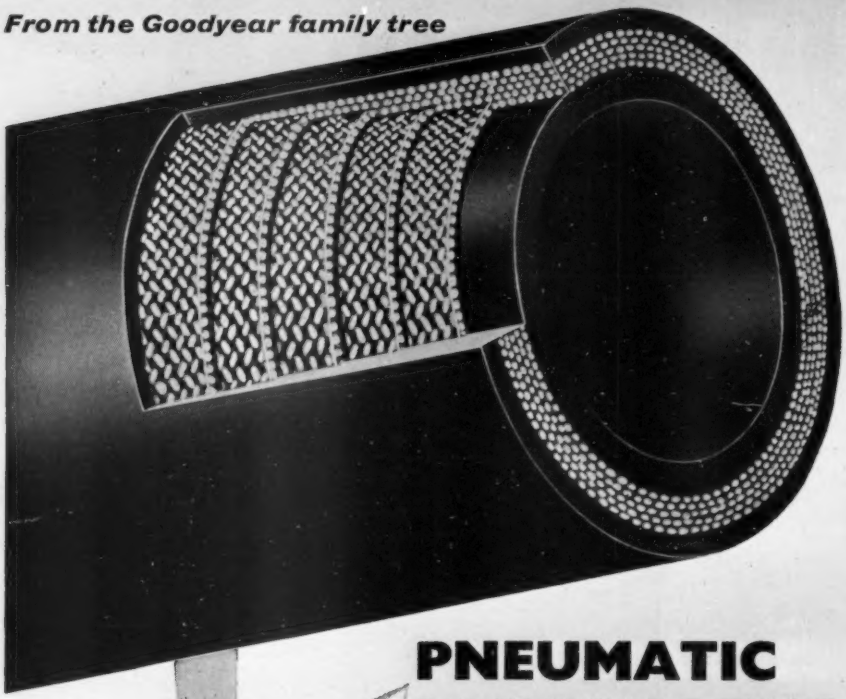

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IRON AND COAL
TRADES REVIEW

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Capital for the Commonwealth

AMONG the topics that will undoubtedly be raised at the Prime Ministers' Conference on the economic side, quite apart from trade relations between the European Free Trade Area and the European Economic Community, will be the urgency of providing development capital for Commonwealth countries abroad.

It is already apparent that while fertility rates have been remaining constant, mortality rates have been declining following advances in medicine, and Asia has accounted for 50 per cent. of the total increase in world population since 1920. Now, one out of every three of the world's population is either Indian or Chinese. On the one hand, India has taken steps at official level to introduce birth control, but on the other hand the Chinese have repudiated the idea and feel perhaps that in the "new world" population counted by the head is a more important factor in international circles than the standard of living which the people enjoy. The population masses of India, Pakistan, and Ceylon all fall as part of our responsibility, and with the growing importance of Africa in world events the wellbeing of millions located there are likely to add a further charge on the resources of the West.

US Government aid figured at 1.4 per cent. of the national income in 1958. For the United Kingdom the comparable figure was about 0.5 per cent., to which must be added a substantial flow of private savings oversea, making in all about 1.25 per cent. of the national income. The French contribute 2.0 per cent., but a large part of their contribution is absorbed in solving current difficulties in Algeria. Western Germany to date has achieved little (about 0.2 per cent.), although it is felt in many quarters that much could be done to stimulate the flow of funds from the Federal Republic now that Germany has achieved a substantial surplus on her balance of payments. The difficulty in the United Kingdom has been that in recent years there is little purpose in attempting to invest a deficit, and what balance has been available, though significant, is yet quite unsatisfactory when measured alongside the size of our commitments abroad.

To give some idea of the scale of investment required for large projects, the following are perhaps representative examples. The Indus settlement negotiated between India and Pakistan ranks for £357,000,000; the aluminium project in Ghana, £343,000,000; the Snowy River hydro-electric scheme in Australia, £338,000,000; barrages running across the Niger and Kaduna rivers in Nigeria, £121,000,000; and, finally, a project to divert river waters inland in Australia to render neglected lands fertile (as an initial item), £100,000,000. Aid, of course, is a world-wide responsibility, and while in recent years immense sums have been diverted from international institutions (the World Bank and the IFC, $710,000,000 last year), it would seem that the absorbent capacity of oversea territories is unlimited.

Recently it became obvious that the pace of economic development necessitated expansion of aid if the struggle for an improved standard of living was to be won. Political consciousness in the under-developed areas awakened the desire to share more fully in the world's bounty, and the struggle against Communist infiltration, quite apart from questions of humanity, impressed on the West the urgency of finding a portion of the monies required. It should be appreciated that most of the nascent States have been able to generate part of the funds by "tightening their belts," and also that the aid from the USSR, while focused on certain countries, has been distinctly disappointing when the figures actually disbursed are contrasted with the monies contracted to be made available.

This year should witness the formation of the International Development Association, an international body, the third affiliate of the World Bank, which has been designed to supplement the activities of the other two. To the capital resources Britain is a substantial subscriber. The funds will be made available in suitable cases to all under-developed countries wherever situated at comparatively low rates of interest, the loans to be made repayable over a long term of years. The payments in some cases will not commence until the projects have reached the initial stages of profitability, and in others monies will be provided for improving water supply, sanitation, and pilot housing schemes.

It should not be forgotten that quite apart from the UK subscription to the several international institutions, Government aid is made available through various Acts, including the Export Guarantees Act, and in association with a host of private enterprises. The immense contribution made by the mining and finance houses of the City of London for oversea investment should not be overlooked, nor the provision of private capital injected into industry generally, which has been canalized by boards of management into the establishment of affiliates in distant lands.

The question may well arise whether a Common-

wealth Bank should be formed to assist the work already being done. It would seem, however, that it would be unlikely to tap any new sources of supply, and that Britain and Canada, and to a limited extent South Africa, would be the sole providers of the funds required. As the United Kingdom is at the moment fully committed, there would hardly appear to be a case for launching such a project at the moment. What should be done, however, is to see whether people generally could be made investment-minded, so that profitable use could be made of their savings, and, further, whether the Government itself through prudent economies could spare at a little later date a slightly higher percentage of the national income for a truly deserving cause.

£10,000,000 Expansion by John Lysaght

DEVELOPMENT scheme costing £10,000,000 at the Normanby Park, Scunthorpe, steelworks of John Lysaght, Limited, has been approved by the Iron and Steel Board. This is the third post-war development scheme at the works and a continuation of the second £13,500,000 plan. It is expected to be completed in 18 months.

The new scheme will include the installation of new mining equipment at the company's open-cast ironstone quarries in the Scunthorpe district and the underground mines in the Caistor area of north Lincolnshire. Two other major features of the work are the addition of a third sinter strand to the ore preparation plant and the increase of the hearth diameter of the Normanby Park blast furnaces.

It is expected that the expansion will increase the steel ingot production at Normanby Park from 600,000 tons a year to about 900,000 tons. The company is also laying down one of the new continental oxygen steelmaking plants. The project will provide jobs for 150 to 200 more men.

A few weeks ago, the Appleby-Frodingham Steel Company, branch of the United Steel Companies, Limited, announced a £28,000,000 expansion of its steelworks at Scunthorpe. The Redbourn Works of Richard Thomas & Baldwins, Limited, at Scunthorpe are at present being modernized and expanded at a cost of £23,000,000.

L. D. Converter Arrives from Ebbw Vale Steelworks

FIRST L.D. converter for use in this country arrived at Newport Docks from Germany on Wednesday en route for the Ebbw Vale steelworks of Richard Thomas & Baldwins, Limited. Ebbw Vale is the first steel plant in Britain to install the process, but it will be widely used in RTB's new Spencer Steelworks.

The converter is one of the largest single pieces of industrial equipment ever to be landed in Britain and, because of its size, it will have to be delivered by a special route from Newport to Ebbw Vale.

Passing Thoughts . . .

ONE of the less desirable features of full employment in recent years has been the disincentive to youths to take on apprenticeships in preference to unskilled jobs with no prospects but much better rates of pay in the short run. Apprentices complain that they find themselves earning much less than their girl friends, let alone their less skilled male workmates. —Financial Times.

A youngster ought to be prepared to accept a lower wage if in return he gets some real training. Too often in practice he finds himself doing an adult job on the cheap.—The Guardian.

These youngsters, smitten with the common craving for money, have taken as their model the stoppages and threats of stoppages which in recent months they have seen full-blown trade union rebels conduct to victory.—Yorkshire Post.

It should not be above the competence of the unions to dispose of their differences without recourse to internecine warfare.—MR. ARTHUR WILLIAMS, *general secretary of the Newcastle-based Shipconstructors' and Shipwrights' Union.*

If employers were to provide facilities for properly regulated ballots to be held, and for trade union business to be conducted in the factories, instead of in the back rooms of public houses, we should attract a better type of shop steward, and have fewer wildcat strikes.—MR. L. G. T. FARMER, joint managing director of the Rover Company, Limited.

In amongst the welter of selfishness, self-pity, and downright irresponsibility which has characterized the annual conference of the South Wales Area of the National Union of Mineworkers the small voice of commonsense has been heard only with difficulty. Like the first cuckoo, it has been indistinct, far off, and almost inviting disbelief.—Western Mail.

In the wake of the new steel plants and car plants which are being created will come subsidiary industries to balance our economy. The possibilities are immense, and no Welshman with any sense of adventure can look to the Wales of our children and grandchildren without excitement.—LORD BRECON, Minister of State for Welsh Affairs, writing in the Western Mail.

Quality can refer to anything from a Rolls-Royce engine to a British Railways meal.—MR. R. H. S. LESSER, *head of the central quality control department of Philips Electrical, Limited.*

They (the Victorians) shied away from new ideas. Our problem is no longer lack of courage to back promising industrial ideas—modern Britain is altogether more venturesome—it is that of picking the winners among a multiplicity of new ideas.—Birmingham Post.

Pulsometer Engineering Cuts Dividend by 2½ Per Cent.

WITH a final of 10 (12½) per cent., Pulsometer Engineering Company, Limited, pumping engineers, etc., of Reading, is paying 17½ per cent. for 1959 compared with 20 per cent. Group profits fell from £506,429 to £291,044.

After depreciation and tax—and £75,072 exceptional charges for 1958—the net balance is nearly halved at £85,758, compared with £167,543.

Steel Output Maintained

CONSUMPTION AND STOCKBUILDING INCREASE

EASTER holidays affected steel output in April, but the average weekly output at 478,100 tons was only 7,000 tons under the record March figure of 485,100 tons and well above the 387,300 tons of April, 1959. Preliminary figures confirm the expected rise in stocks held by consumers and merchants and suggest, states the Iron and Steel Board, that an increase of about 225,000 tons (ingot equivalent) may be reached during the first quarter of the year.

Consumption during the first quarter of the year is estimated to have been about one quarter higher than in the corresponding period last year and an additional 1,000,000 tons of steel were required. In addition, the change from running down to building up of stocks accounted for an extra 500,000 tons. Steel production will be increased during the course of the year as a result of the starting of new capacity, but this will be partly offset by the seasonal decline in output during the holiday period.

There may also be some reduction from the current high level of exports partly because of increased competition and partly because of the increased home demand. At the same time imports are tending to increase.

10 Per Cent. Increase in Deliveries

Deliveries of steel from UK mills increased by about 10 per cent. from the last quarter of 1959 to the first quarter of 1960. The increase was spread fairly generally over all products. Only deliveries of plate, rails, colliery arches, and forgings and castings are still below the previous peak levels reached in the last quarter of 1957, although for heavy sections the improvement is due to increased deliveries to export.

In the case of sheet for which the demand was unaffected by the 1958-59 recession, the high level of deliveries from UK mills has had to be supplemented by increased imports. Consumption is over 30 per cent. higher than it was a year ago and total supplies to the home market over 40 per cent. higher.

Latest pig-iron and steel output figures (in tons), with the corresponding 1959 returns, are shown in the following table:—

Period.	Pig-iron.		Steel ingots and castings.	
	Weekly average.	Annual rate.*	Weekly average.	Annual rate.*
1960—February ..	301,500	15,680,000	482,200	25,073,000
March ..	312,300	16,238,000	485,100	25,226,000
April ..	310,600	16,150,000	478,100	24,861,000
1959—February ..	221,800	11,536,000	347,400	18,065,000
March ..	221,200	11,501,000	362,700	18,860,000
April ..	231,300	12,027,000	387,300	20,139,000

* No allowance is made for holidays and figures for months not affected by holidays should be reduced by about 1,000,000 tons.

BRITISH OVERSEAS MINING ASSOCIATION Scholarship, worth £350 a year, has been awarded to Howard Rose of Bembrose School, Derby.

Iron and Steel Board Appointments

TO succeed Mr. N. H. Rollason, whose appointment expires on May 31, the Minister of Power has appointed Mr. Alan James Peech as a part-time member of the Iron and Steel Board with effect from June 1.

MR. A. J. PEECH

Mr. Peech, who is deputy chairman and general managing director of the United Steel Companies, Limited, succeeded the late Mr. Gerald Steel in the latter office in September, 1957. He is also a director of the British Iron and Steel Federation's trading companies, the British Iron and Steel Corporation, Limited, and BISC (Ore), Limited, and of Barrow Steel Works, Limited, the Butterley Company, Limited, McCall & Company (Sheffield), Limited, the Steetley Company, Limited, Tinsley Wire Industries, Limited, and Templeborough Rolling Mills, Limited.

The Minister has also appointed Mr. A. H. Wilson, FRS, deputy chairman and managing director in charge of research and development of Courtaulds, Limited, to be a part-time member of the board from June 1.

HALL-THERMOTANK BUYS NEW ZEALAND COMPANY

ALL the issued capital of Ellis Hardie Symington, a private company incorporated in New Zealand has been acquired for £330,000 by Hall-Thermotank, Limited, a holding company of engineers and founders. The board of Hall-Thermotank believes that the acquisition will strengthen the group's position in New Zealand.

Ellis Hardie Symington carries on the business of engineers and machinery merchants and for the past 20 years has represented J. & E. Hall, Limited, a member of the group in New Zealand.

FRANCIS SUMNER (HOLDINGS), LIMITED—Sir Anthony Miers, VC, Mr. Simon Kale, and Mr. Jack Grant have been elected to the board.

Appointments

Group Manager for East Midlands Coal Board Area

FORMERLY agent-manager of Rufford Colliery, Mr. J. E. WOOD, has been appointed No. 1 Group manager, No. 3 (Edwinstowe) Area, East Midlands Divisional Coal Board. The group comprises Rufford, Blidworth, and Sherwood collieries. Mr. Wood, who is 36, was educated at Wolstanton Grammar School and King's College, Durham University, and joined the mining industry in 1940. He was appointed overman in 1949 and acting undermanager in 1950.

Mr. Wood became manager of Madeley Colliery, West Midlands Division, in September, 1951, and later was manager of Wolstanton Colliery. In November, 1956, he was appointed manager of Welbeck Colliery (Notts), and transferred to Rufford Colliery two years ago. A B.Sc.(Mining) with first-class honours, Mr. Wood is a member of the National Association of Colliery Managers and was for a time secretary of the North Staffordshire branch.

Mr. E. LARNER has been appointed manager of the Rollpin spring fasteners division of the Tempered Spring Company, Limited, Sheffield.

Mr. H. C. R. TREWMAN has been appointed marine sales specialist of Brush Electrical Engineering Company, Limited. Loughborough (Leics).

Mr. J. G. FISHER and Mr. A. S. FERGUSON have been appointed sales engineers by BICC-Burndy, Limited, and will be based at Prescot. Mr. Fisher was formerly colliery assistant and electrical engineer with the National Coal Board.

Staff college of Richard Thomas & Baldwins, Limited, Stoke D'Abernon, has appointed Mr. C. EDWARDS, mill manager at Gowerton steelworks, Mr. J. H. HOPKINS, of the productivity engineering department at Ebbw Vale, and Mr. M. MORDEN, of the blast-furnace department at Redbourn, as tutors primarily responsible for foreman training.

Mr. G. B. JONES, assistant marketing manager of the South-Western Divisional Coal Board has retired after 50 years in the tinplate and coal industries. In his early days he was purchaser for Richard Thomas & Baldwins, Limited, for all supplies of solid fuel at their various centres of operation. Later, when RTB acquired four collieries, Mr. Jones became commercial manager with responsibility for coal sales. At vesting date, he joined the Swansea staff of the divisional marketing department, and was appointed assistant marketing manager in 1950.

NIFES Refresher Course

A WIDE range of subjects will be covered at the seventh annual residential refresher course of the National Industrial Fuel Efficiency Service at the Clarendon Laboratory, Oxford, from September 26 to 30. Each subject will be presented by an expert in the field and particular attention will be paid to practical application.

Among the subjects will be: "Coal and the Industrial Consumer," "Automation and its Impact on the Plant Engineer," "Five Years' Progress in Fuel Utilisation," "Role of the Central Engineering Workshop in the Maintenance Plan," "Recovery and Use of Waste Heat in Industry," and "Factors Affecting the Choice of Industrial Boiler Plant."

George Medal for Manager in Pit Rescue

COLLIERY manager who although almost overcome by firedamp dragged his inert undermanager single-handed to safety out of a Yorkshire pit has been awarded the George Medal, it was announced in Tuesday's "London Gazette". He is Mr. James Gillan (48), of Hartley Bank Colliery, Wakefield.

News that the undermanager had been overcome in an accumulation of firedamp was brought to the surface by two deputies whose rescue efforts had failed. Mr. Gillan called for the Wakefield rescue team and descended at once with two workmen carrying a reviver set. He knew he needed breathing apparatus to crawl the 70 yards to the casualty, but he also realized that the undermanager's chance of survival depended on immediate action.

He went in using the reviver set, reached his man, and dragged him out. The rescue team found them crouched 20 yards from fresh air, both breathing oxygen from the reviver set's supply tube. Mr. Gillan's efforts in dragging the inert body had dislodged the tube from the mask and he had been partially overcome. But he saw the detached tube as he fell and was able to grasp it to revive them both.

Scottish Board to Resume Adult Recruitment

RECRUITMENT of men by the Scottish Divisional Coal Board may be resumed some time this year, said Mr. R. W. Parker, chairman of the division, in a speech at Edinburgh on Thursday of last week. He told members of the Scottish Women's Advisory Committee on Solid Fuel that the average wastage figure in the division was about 8 or 9 per cent. a year.

This meant that miners in redundant pits could all be re-employed, but it was felt that the time was approaching when adult recruitment should resume because of the rundown in manpower. Mr. Parker suggested next August or September as a possible date for resumption. He added that the board was now prepared to take on juveniles in every Area.

MINING ENGINEERS SEE NEW SHEARER

MAY technical progress meeting of the mechanization engineers of the Northern (N&C) Divisional Coal Board was held at the divisional offices at Longbenton. After the meeting a visit was paid to Bedlington "F" Colliery (Northumberland) to see the first chain-hauled Anderton shearer loader in the country operating in the High Main Seam.

This machine has now completed four months' service at the colliery and has given satisfactory results. The divisional engineers saw the ease of operation achieved by chain haulage and its dependability and increased efficiency.

WHEWAY WATSON & MCLEAN, LIMITED—Group profits for the period ended December 31, 1959, were £52,120, less tax of £27,420. Ordinary dividend for the period is 25 per cent.

SCHUMAN PLAN ANNIVERSARY

Its Author on ECSC Achievements

TENTH anniversary on Monday of the Schuman Plan Declaration is marked by a statement by M. Robert Schuman, the first president of the High Authority of the European Coal and Steel Community which developed from his plan. Recalling its birth, M. Schuman said that in 1950 the states of Western Europe were engaged in a merciless economic struggle among themselves which could end only in the loss of their independence. To achieve the essential unification of Europe a federation was naturally suggested.

"Coal and steel were an obvious choice," he said. "They combined all the conditions of technical success and economic and political effectiveness. On the one hand, the widening of the market for these key products would be a guarantee of expansion, and of improvement in living standards, moreover, reciprocal control would deprive each of the associated countries of the possibilities not only of making but even of preparing for war."

Admitting that neither criticism nor difficulties had been lacking, Mr. Schuman added that it was clear not only that the Community had asserted itself and won its spurs, but also that European unification had made new strides with the creation of the Common Market and Euratom.

"Political Unity Ahead"

Although the plan bears M. Schuman's name, the man who envisaged it and helped to develop it was M. Jean Monnet, himself a past president of the High Authority. In an interview, M. Monnet said that the Coal and Steel Community, which was the first step in economic union, had, despite the failure of the European Defence Community, brought forth Euratom and the Common Market.

"In 1950, it was not possible to envisage the economic union which is today well on the way to being achieved. But I believe that, just as the Coal and Steel Community made the Common Market possible, and the Common Market is bringing about economic union, so, tomorrow economic union will create the conditions from which political unity will derive."

To mark the anniversary, Mr. Herter, US Secretary of State, has sent a message to Signor Piero Malvestiti, current president of the High Authority. He writes: "The success thus far achieved by the ECSC in establishing a single market and showing the way for further progress in the creation of new European communities has been noteworthy. These developments represent a major contribution to strengthening free Europe and reinforcing Atlantic co-operation."

The Hallstein plan for speeding up the Common Market time-table was on Tuesday agreed in principle by the Ministers of the Six. The plan will operate from January 1, 1961, and as approved on Tuesday is a slight dilution of the original proposals put forward by Prof. Hallstein in Brussels. First steps towards the common external tariff will be taken 12 months in advance of the Rome Treaty timetable.

The Ministers refused to agree in advance to cut external tariff rates by 20 per cent., adding that this concession will be made only if there is "sufficient reciprocity" from other nations negotiated beforehand.

Head Wrightson Wins £2,500,000 Orders

RECEIPT of two orders worth £2,500,000 for steel strip handling equipment is announced by Head Wrightson Machine Company, Limited, of Middlesbrough, a subsidiary of Head Wrightson & Company, Limited. All the work will be undertaken by the group's various establishments on Tees-side.

One order is for the supply of five cut-up lines for the new Spencer Works at Llanwern (Mon) of Richard Thomas & Baldwins, Limited. Two of these lines will be designed to handle hot rolled material and three for handling cold rolled strip. They are expected to be in full production by October next year.

The other order is for two steel strip lines, of almost identical design, for the new Ravenscraig plant of Colvilles, Limited. Head Wrightson is already engaged on the provision of similar lines for South Africa and Australia, and also for the Steel Company of Wales, Limited, and John Summers & Sons, Limited, Shotton (Ches).

To carry out this heavy programme, the technical staff will have to be increased and additional office accommodation brought into use.

Durgapur Steelworks Goes into Action

FIRST ingot was successfully rolled and sheared on Monday morning at the new Durgapur steelworks which the British consortium, ISCON, is building in West Bengal. During the day, 250 tons of ingots were rolled on the Davy-United 42-in.-blooming mill, the primary rolling unit of the works. The next mill in the production line, the 32-in. intermediate blooming mill, was planned to start up on Wednesday. The entry of these mills into service signals the start of real production at Durgapur.

Davy & United Engineering Company, Limited, of Sheffield, a member of ISCON, has commitments totalling about £29,000,000 for Durgapur. The company is responsible as main contractors for the rolling mills, the wheel and axle plant, the central engineering maintenance shops, and the iron and steel foundry.

Mr. H. E. JACKSON, executive director (engineering) of Tecalemit, Limited, Plymouth, has left on a sales promotion tour in South America.

Mining and Metallurgy Gold Medal Awards

IN recognition of many years' distinguished service to mining Mr. Edward Duffield McDermott and Mr. Julius Kruttschnitt have been awarded gold medals of the Institution of Mining and Metallurgy. The institution also announces several other awards.

Mr. McDermott, whose award is also for services to the institution as its representative for 15 years on the governing body of the Imperial College of Science and Technology, had world-wide experience as a mining engineer and manager of mines during the 25 years following his graduation in 1903. In 1928, he joined Mining Trust, Limited, in London, with whose activities he has since been associated. He has been for many years a director of the Britannia Lead Company, Limited, and of other mining companies. Mr. McDermott has served as a member of council of the institution since 1932, was vice-president from 1935 until 1938, and president in 1939-40. Honorary membership of the institution was conferred upon him in 1952, after 53 years as a member.

Mr. Kruttschnitt's award is for distinguished services to mining in Australia. He is a director of Mount Isa Mines, Limited, which he joined in 1931 as general manager. Soon afterwards he became chairman. The institution comments that the success of the Mount Isa operations in face of many technical and financial difficulties can largely be attributed to his leadership. Mr. Kruttschnitt has been a member of the institution since 1931, and served as oversea member for Australia from 1942 until 1946. He was president of the Australasian Institute of Mining and Metallurgy in 1939 and 1952.

Honorary membership of the institution has been conferred on the following: Lord Robins, for services to the mineral industry, particularly in southern Africa; Sir Reginald Patrick Linstead, for services to mining and metallurgical engineering in the field of education: and Mr. George Augustus Whitworth, for services to mining and to mark his retirement as principal of the Camborne School of Metalliferous Mining.

The Consolidated Gold Fields of South Africa, Limited, gold medal for 1958-59 has been awarded to Mr. Sydney Charles Newman, for his paper "Sinking No. 2 shaft, Harmony Gold Mining Company, Limited, O.F.S." Recipient of the same company's premium of 40 guineas is Mr. Felix Mendelsohn, for his paper "Structure of the Roan Antelope Deposit." The Arthur Claudet student's prize goes to Mr. Henry Neville Rhoden, for his paper "Structure and Economic Mineralization of the Silvermines District, Co. Tipperary," and the William Frecheville student's prize to Mr. Michael John West, for his paper "Economic Factors in the Design and Operations of Underground Ventilation Circuits."

Dunlop and Oldham's Australian Venture

JOINTLY owned sales company is to be set up in Australia by Dunlop Rubber Australia, Limited, and Oldham & Son, Limited, Manchester. The new company will be known as Dunlop Oldham Pty., Limited, and will market the Oldham "PG" and other batteries throughout Australia.

"PG" batteries will be manufactured at Artarmon, Sydney, where the Oldham company has installed new plant and equipment to provide complete manufacturing and technical service. The organisation of distribution and after-sales service is based on the Dunlop sales organization throughout the Continent.

Shipbuilding Inquiry Sub-committee Formed

SUB-COMMITTEE to inquire into the future of the shipbuilding industry has been established by the Shipbuilding Advisory Committee of the Ministry of Transport. The wide terms of reference of the sub-committee are "to review the prospects of and the problems facing the shipbuilding and shiprepairing industries and to make recommendations."

The sub-committee will make its report to the main committee. Its chairman will be Sir James Dunnett, Permanent Secretary to the Ministry of Transport, who succeeded Sir Graham Cunningham as chairman of the main committee following Sir Graham's resignation earlier this year.

Members of the sub-committee are from the following organisations.—Shipbuilding Conference: Col. T. Eustace Smith, president, and chairman and managing director of Smith's Dock Company, Limited, Middlesbrough; Mr. A. H. White, chairman and managing director of Lithgows, Limited, Port Glasgow; and Mr. R. B. Shepheard, director of the conference. Shipbuilding Employers' Federation: Mr. G. H. R. Towers, chairman and managing director of John Readhead & Sons, Limited, South Shields; Mr. R. W. Johnson, a director of Cammell Laird & Company, Limited; and Mr. N. A. Sloan, a director of the confederation. Confederation of Shipbuilding and Engineering Unions: Mr. E. J. Hill; Mr. G. H. Doughty; Mr. H. G. Barratt; and Mr. A. Williams.

Tees-side Ferrous Scrap Firms Combine

TWO of the oldest firms in the Tees-side ferrous scrap business, Thomas, Thomas & Company (Est. 1919), Limited, of Middlesbrough, and A. Bainbridge, Limited, of Thornaby, have amalgamated under the name Thomas, Thomas, & Bainbridge, Limited, with a registered capital of £100,000. The company will operate from the North Yorkshire Ironworks, Thornaby, the headquarters of A. Bainbridge for many years.

The directors are Mr. H. E. Thomas, Mr. B. Thomas, Mr. W. H. Carvell, and Mr. W. G. Readman, with Mr. G. Farren as secretary. The amalgamation has been under consideration for some time as the Thomas family has, since 1930, held a controlling interest in A. Bainbridge and also the entire share capital of Thomas, Thomas & Company.

Greenock Dry Dock Loan Considerations

SOME aspects of the offer by the Treasury of financial aid to the £4,250,000 graving dock scheme at Greenock, sponsored by the Firth of Clyde Dry Dock Company, Limited, required further consideration, said a statement issued after a meeting of the company in Glasgow on Monday. A loan of about £3,000,000 was promised by the Treasury, but was subject to certain conditions and to the Treasury's examination of the scheme.

The scheme includes a 1,000-ft. dry dock, a tanker cleaning installation, and repair wharves, and would provide work for about 1,000 men.

EMPLOYEES of Horace Green & Company, Limited, dynamo manufacturers, of Keighley (Yorks), were taken to Dublin by air on Saturday to celebrate the firm's golden jubilee.

Law Cases

SALE OF IRON ORE

£7,087 Damages for Breach of Contract

DAMAGES of £7,087 and costs were awarded in the High Court to The Bremar Company, Limited, importers and exporters, of Great Cumberland Place, London, W.1, against Integral Technical Equipment Company, Limited, of Cromwell Road, London, S.W.7, for breach of a contract for the sale of 10,000 tons of iron-ore. Mr. Justice Pearson said that Integral Technical Equipment, the defendant company, was in breach of a contract made in May, 1957, because it had been unable to pay for the ore in ordinary currency, but wanted to do so in Czechoslovakian-Brazilian clearing dollars, which was unacceptable to the plaintiff.

The defendant company denied there was a contract and contended that negotiations never reached fruition, but the judge found that the dispute over payment arose out of a contract. The plaintiff at first agreed that payment should be made in sterling but later accepted the defendant's amendment that it be made in US dollars.

The judge did not accept that the plaintiff falsely pretended that the agreement to pay in US dollars had been made and was satisfied that there had been an agreement, although the defendant denied it. A clause of the contract provided for any dispute to go to arbitration by the London Metal Exchange. The plaintiff had been given judgment when the matter was taken to arbitration and the judge held that the clause was valid.

"AUTHOR OF OWN DEATH"

MINER who was killed in a coal face accident at Woolley Colliery (Yorks) was "the author of his own death," said Mr. Justice Winn at the Yorkshire Spring Assizes in Leeds. The man's widow, Mrs. Florence Winkler, who alleged negligence by the National Coal Board, was awarded £2,868 damages and costs. The judge found 60 per cent. contributory negligence by the man who was killed, Mr. Johann Winkler (37), and a failure by some NCB employees to take reasonable care for the safety of workers in the seam. Mrs. Winkler was awarded 40 per cent. of £6,600.

Mr. Winkler was said to have been killed by a roof fall at a face nearing the end of its working capacity because of a fault. A new face had been driven. The judge said: "I find this was a disaster for which Winkler more than anyone else was responsible, and which he brought upon himself as the author of his own death by omitting to take elementary precautions."

DELIVERED STOLEN COAL

TWO drivers employed by the National Coal Board delivered stolen coal to a housewife and kept the money themselves, it was stated at Burslem Stipendiary Court. Job Thomas Pettitt (37) and James Gidman (28), who were accused of stealing 3 cwt. of coal, worth £1 11s., while servants of the NCB, were each fined £8 with 12s. costs. They each pleaded Not Guilty.

Police Supt. F. Shepherd said the men delivered five bags of coal to the housewife and then handed in money and an invoice for only two bags. Pettitt claimed that the difference between the invoice handed to the woman and the one remaining in the invoice book arose from a clerical error after the self-carbonating sheet had failed to make an impression. The other defendant said he had nothing to add to that explanation.

£400 DAMAGES SOUGHT

DAMAGES of £400 were sought at Rotherham County Court against Park Gate Iron & Steel Company, Limited, by an employee whose hand was trapped by a rolling mill which seized. Judge Ernest Ould adjourned the case indefinitely saying that it might have to be resumed in Sheffield.

The plaintiff, Mr. John Newton Garrett (42), it was stated, had occasionally to feel the temperature of some bearings to see if they were running too hot. He was doing this when a bearing in the mill suddenly seized, trapping his hand, and cutting off the top of one finger.

Steel Price Structure Welcomed by Stockholders

BRISK demand for steel in all areas is reported by Mr. G. P. Philipson-Stow, chairman of Miles Druce & Company, Limited, iron and steel stockholders, of London, W.3. "So far the famine conditions of three or four years ago have fortunately not returned, and we are, of course, far better situated to meet the demand."

One satisfactory feature of 1959, he states, was the recognition of stockholders implicit in the new price structure introduced by the Iron and Steel Board on June 1. The stockholding trade had long contended it was wrong for steelmakers to sell in what amounted to retail quantities. He felt that tonnage rebates for buyers of large quantities were a step in the right direction. In certain consumer quarters there was also a growing recognition that the payment of the modest stockholders' margin when need arises is generally more economic than the holding of stocks of such magnitude as would obviate purchases from stock in any circumstances.

In reply to a shareholder's question about the increase in the authorized capital by the creation of 240,000 £1 preference shares, Mr. Philipson-Stow said there was no immediate intention of making a rights issue.

New Duties With RTB for Mr. W. O. C. Adamson

ALL constructional activities and administration undertaken by Richard Thomas & Baldwins, Limited, are to become the responsibility of Mr. W. O. Campbell Adamson, who was appointed general manager of the new Spencer Works at Llanwern (Mon) last July. These duties are additional to the operational management of the Spencer Works.

MR. W. O. C. ADAMSON

The appointment has been made because Mr. E. Pinches, general manager (engineering) is being released from his executive responsibilities through illness. He will, however, remain in a consultative capacity. Mr. R. A. Lake, formerly assistant general manager (engineering) at Ebbw Vale, has been appointed chief engineer of the Spencer Works, responsible to Mr. Adamson.

Tap & Die Estimates Profit of £650,000

ESTIMATES that consolidated net profits, before tax, for the year to May 31, 1960, should exceed £650,000 are made by the Tap & Die Corporation, Limited, of London, W.1. The figure is adjusted to an annual basis in the case of the new acquisitions, International Twist Drill Company, Limited, of Sheffield, and John Harris Tools, Limited, of Warwick. Profits for their last completed years were: Tap & Die £314,691, International £163,418, and Harris £50,808.

On the capital as increased by the acquisitions a final dividend of at least the previous year's 10 per cent. is foreshadowed. This would maintain the effective 16 per cent. total. The rights issue, which was under consideration, is not to be proceeded with at present, but the position will be reviewed later in the year when the 1959-60 accounts are available.

Any foreseeable requirements, meanwhile, will be covered by bank arrangements. At April 25, 1960, the net indebtedness, after allowing for short-term deposit holdings was about £310,000.

"One Nation" Attitude Urged on Industry

INDUSTRY must develop the "one nation" attitude, said Mr. Edward Heath, Minister of Labour, at the annual banquet of Birmingham Chamber of Commerce last Friday. "There are not two great battling sides in industry—there are not two nations," he said.

Mr. L. G. T. Farmer, president of the chamber, said there was considerable concern about the wisdom of Governments "persuading" industry to disperse to localities not of its own choosing. With increasing competition from abroad he wondered whether British industry might not be at a disadvantage in not being wholly free to choose the shape of its operations.

London Premiere for United Steel Films

DISABUSING the minds of his fellow guests in London on Monday, the Lord Mayor of Sheffield, Ald. A. V. Wolstenholme, said that it was a mistake to think of his city as a dirty industrial centre. Thanks partly to smokeless fuels, such as were produced at plants within the United Steel Companies, Limited, group, it had been possible to declare the city centre a smokeless zone and it was intended to keep it so.

The Lord Mayor was speaking at the premiere of two films—"Out of the Forest" and "Stone into Steel"—which have been made for United Steel and which will be shown in the coming weeks to shareholders throughout the country. Also among the guests were two of the city's MPs, Sir Peter Roberts, former Master Cutler and chairman of Newton, Chambers & Company, Limited, Thorncliffe, near Sheffield, and Mr. George Darling.

The films feature the work carried out by two members of the United Steel group—the United Coke & Chemical Company, Limited, and Appleby-Frodingham Steel Company, Scunthorpe. "Out of the Forest" traces the carbonization of coal for metallurgical coke to feed the Appleby-Frodingham and other blast furnaces in the group and indicates some of the vast potentialities of coal by-products.

"Stone into Steel"—a first-class piece of film-making—tells how Appleby-Frodingham, the largest single unit in the United Steel group, turns the ore from Lincolnshire and Northamptonshire ore fields into steel plates, structural girders, and other finished products. Steelmaking lends itself to the technique of the film and although the film has made every use of visual effect to indicate the power, and strength of the process, it has not overlooked the importance of the human element.

COUNCIL APPROVES LIMESTONE MINE PROJECT

TO accommodate a £4,000,000 open-cast limestone mine which the Associated Portland Cement Manufacturers, Limited, want to establish at Oxwellmains, near Dunbar, East Lothian County Council agreed on Monday to amend its county development plan. Sir James Hope, and the Duke of Roxburghe have refused to sell the 325 acres of land needed.

The company said the mine would provide jobs for more than 300 workers. Provost W. G. R. Findlay, of Dunbar, vice-convenor of the county council, said after the meeting that there would almost certainly be a public inquiry. If the mine were established, it would mean continuous employment for 50 years.

Pyrene's Future Development in South Wales

NEGOTIATIONS with one of the Ministries for the lease or purchase of a factory in South Wales for the Pyrene Company, Limited, are at an advanced stage and plant to the value of £362,000 has been sanctioned for production there, states Mr. F. A. J. Harrison, the chairman. This is the first phase of a development plan which will cost £1,000,000 up to the end of 1962.

The 1959 group profit of £381,976 (£368,409) was a record and the dividend is maintained at 27½ per cent. on capital increased by a rights issue.

IRON AND STEEL TRADE

NO hint of a steel shortage, present or impending, is to be discovered in the latest census of stocks held at producers' works. At the end of February the total tonnage in hand was 2,260,000 tons—the highest figure recorded since August, 1959. The very sharp rise in deliveries to home consumers and in shipments oversea suggests that restocking by consumers has begun, but rollers are generally able to adhere closely to promised delivery dates and appreciate the new trend towards buying for future needs since it permits the arrangement of more regular rolling programmes.

Pig-iron

The pig-iron requirements of the makers of iron castings are very subdued and a rising proportion of the aggregate output of the blast furnaces is exclusively concentrated upon basic iron for the open hearths, for which there is a constant demand.

The proportion of this grade of iron used in the melting shops is still exceeded by the scrap consumption.

Ferro-alloys

There has been a reduction of 2d. per lb. W. in the price of ferro-tungsten, so that the price is now 11s. 6d. per lb. W. contained. Tungsten metal powder is similarly reduced to 14s. 6d. per lb. The demand for ferro-tungsten is slightly quieter at the moment. The 45 per cent. Si. and 75 per cent. Si. grades of ferro-silicon continue to be well supported, while ferro-chrome is also in active demand. There is a fair request for calcium silicide, and the demand for ferro-manganese and silico-manganese is at a good level.

A steady call exists on supplies of ferro-niobium and ferro-titanium. Moderate support is given to ferro-molybdenum and there is a fair demand for ferro-vanadium.

Semi-finished Steel

A feature of the £26,000,000 expansion plan of the English Steel Corporation, Limited, is the replacement of the company's 40-year-old billet mills at the River Don and Stevenson Road (Sheffield) works by a modern installation comprising a 42-in. blooming mill and two 32-in. billet mills designed to increase capacity for billet production by 250,000 tons a year.

The new plant is not expected to become operable until 1963, but it will help to reduce or overcome the present inconvenient shortage of billets which has been met only by a resumption of imports from near continental ports.

Finished Steel

Sheet and strip are placed high on the list of priorities for finished steel products; hence the feverish activity of steel developments in South Wales. But all classes of constructional engineering are requisitioning increased tonnages of joists, beams, sections, and plates, considerable quantities being required for the acceleration of the steel industry's own development programme.

The market for light re-rolled products is also exceptionally brisk and some improvement is recorded in the call for railway material. Wire rods are selling more freely and so also are bars, rounds, and squares.

DRYSDALE & COMPANY, LIMITED—Mr. John A. Carpenter has joined the board.

Cammell Laird's Big Capital Spending

HEAVY capital expenditure in 1959 is reported by Admiral Sir Michael Denny, chairman of Cammell Laird & Company, Limited, holding company of shipbuilders and engineers. At the year-end there were outstanding contracts for capital expenditure of £2,638,000, of which £2,420,000 was for the shipbuilding subsidiary and £218,000 for the steelmaking subsidiary.

During the year, the chairman states, the policy was continued of ploughing back retained profits into large-scale modernization schemes, both at Birkenhead and Wednesbury. These schemes, particularly at Birkenhead, were already showing results. He said that although conditions had improved in the steel industry and there had recently been a few more inquiries for ships, 1959 was a difficult year for the group. The advantageous conditions under which ship operating industries in other countries exist in comparison with our own have clearly become a matter of great import.

Net profit declined from £689,775 to £272,391 and the dividend is effectively reduced from 15 per cent. to 7 per cent., but with the 4 per cent. final dividend there is a capital distribution of 2½ per cent. (nil).

Demands on Alfred Herbert Exceed Output

DEMAND for most types of machines and workshop accessories was well above present output, reported Col. C. W. Clark, chairman of Alfred Herbert & Company, Limited, machine-tool makers, at Monday's meeting in Coventry. He said the directors were facing the "tough problem" of increasing production as quickly as possible. More skilled men were needed now and the need would increase as suppliers made heavier deliveries of materials and components.

Col. Clark reported that specialist suppliers of stampings, forgings, anti-friction bearings, electrical equipment, etc., were co-operating, but the company's own output could not be increased to any considerable extent until additional supplies of these materials were received.

STOTFOLD (Beds) firm of industrial oil and gas burner manufacturers, Schieldrop & Company, Limited, is now associated with Hamworthy Engineering, Limited, Poole (Dorset), which makes similar appliances. Schieldrop will continue to operate as before with Mr. I. P. Frost as managing director.

Non-ferrous Metals

Tin and Copper in the News

TIN has been very much in the news owing to the International Tin Council's announcement last week that it had decided to withdraw the buffer stock manager's authority to buy and sell tin, except when the price is below £780 or above £830 a ton. This announcement injected a bullish attitude into the market as it had been believed that the Tin Council's policy was to keep the price of tin permanently below £800 a ton. In the US the market is quiet with the price moving narrowly around 99 cents a pound.

Refined copper stocks in LME warehouses rose further last week and now stand at 3,229 tons, an increase of 650 tons. This inclined the market easier and it now remains to be seen whether the former chronic shortage of metal is on its way to being solved. The chief uncertainty overhanging the copper market in London is the strike position in Chile. The strike at El Salvador and Potrerillos duly materialized as expected at the beginning of last week, at which time it was also thought that the other Chilean copper companies could be induced to come out on strike in sympathy.

However, the general strike which was scheduled to start at the beginning of this week has been postponed. The reason, it is stated, is because the Chilean Labour Minister is hoping to arrange further negotiations between Anaconda and the unions. There is also the factor that the Chilean Government may well consider such strike action as illegal. The situation has exercised a bearish influence on the market and prices have dropped accordingly with the backwardation now closed up to around £7 a ton.

In the US physical copper continues to move slowly and the price structure remains unaltered at 33 cents a pound for both producers and custom smelters.

Lead remains a firm market in London with demand good, and prices holding steady around £77 a ton. In the US the market is featureless, the New York spot price being unchanged at 12 cents a pound.

Zinc is a mixed market in London, although consumer interest remains at a satisfactory level. The undertone is still sensitive but price changes are not large. In the US the market is also featureless and demand is quiet, particularly for special high grade metal used in the die-casting industry. The US price is 13 cents a pound.

Official metal prices in London yesterday (Thursday) were:—COPPER, Standard: Prompt £249, forward £244. TIN, Standard: Prompt £786, forward £784 10s. LEAD: Prompt £77 12s. 6d., forward £76 12s. 6d. ZINC: Prompt £92 10s., forward £91 15s.

BICC HOLIDAY BREAKS

HOLIDAY periods for this summer are announced by British Insulated Callender's Cables, Limited. Works will be closed for the receipt of goods as follows (all dates inclusive):—Erith, Helsby, and Prescot, July 16 to August 1; Melling, July 22 to August 6; Anchor Works, Leigh, July 2 to 9 and September 10 to 17; Willenhall Foundry, July 23 to August 6.

Skeleton staffs are being maintained to deal with urgent needs. Huyton Quarry Works will not close as holidays are being taken over a four-week period.

COAL AND COKE shipments through the port of Garston in April amounted to 65,735 tons, 63,887 tons of which was coal.

Russia "One Jump Ahead" in Automation

STRIKING example of automatic production in a Russian factory was cited by Mr. A. C. Quarterman, of the Associated Electrical Industries, Limited, electronic apparatus division, in an address to the first European regional conference of the Institute of Internal Auditors, at Blackpool on Thursday of last week. Mr. Quarterman said that the only human operation in the whole manufacturing process of car engine pistons in the Russian factory, was the loading of aluminium ingots on to a conveyor at the input end.

All subsequent operations, he said, were automatic, including casting the piston heads, trimming, heat treatment, hardness testing, all machining processes, grooving, drilling, grinding and polishing, tinplating, and washing. Mr. Quarterman said that Russia seemed to have jumped a step in the evolution of automatic production and gone straight from manual control to fully automatic and integrated control. The trend had been more gradual in other countries, he said.

About 1,000 specialists in industrial automation from 23 countries will attend a week-long conference in Moscow from June 27, mainly to discuss the theory and practical application of automatic control and the necessary instrumentation. Some 285 papers will be presented, including 28 by British specialists, 73 by Americans, and 81 by Russians.

Prof. A. M. Letov, president of the International Federation of Automatic Control, which is sponsoring the conference, said the delegates would also be shown latest Soviet automation developments in industry and research centres at Moscow, Leningrad, and Kiev. Half the reports deal with the theory of automatic control, one third with the application of automation, and the rest with technical instrumentation.

Bid to Increase UK Trade in France

DRIVE to increase UK exports to France is being organized by the British Chamber of Commerce in Paris. A commission on Anglo-French trade development has been set up and the chamber announces the preparation of a simplified check list to tell British exporters about the administrative formalities they have to undergo to do business in France. An additional sub-committee has also been formed to deal with commercial publicity.

British exports to France last year increased by £9,000,000 to £81,000,000 and 75 per cent. of this total comprised manufactured goods. The total value of office machinery exported was £1,500,000, machine tools were worth £2,700,000, textile machinery, £2,300,000, excavating machinery, £700,000, and electronic and radio equipment, £950,000.

COMPLETE RANGE of rubber processing and moulding machinery now being made in Germany is to be made and sold by Baker Perkins, Limited, Peterborough, under agreements made with L. Herbert, of Frankfurt, and Paul Troester, of Hanover. The agreements will allow Baker Perkins, who for many years have supplied mixing and material handling equipment to the rubber industry, to offer a complete processing line to the UK and the Commonwealth.

Company News

Harper Engineering Expands

Acquisition of J. B. & S. Lees

ALL the issued ordinary shares of J. B. & S. Lees, Limited, steel strip manufacturers, of West Bromwich, has been acquired by Harper Engineering & Electronics, Limited. The consideration is the issue of 1,320,000 Harper 1s. shares. During the three years before August 1, 1959, Lees spent about £300,000 on modernization and the purchase of new equipment, including a modern cold rolling plant. This additional equipment is expected at least to double the output of special steel.

The results of this partial re-equipment are already being felt and net earnings, subject to UK tax only, are now running at a rate calculated to the number of Harper shares to be issued, of between 2s. and 3s. a share. Turnover is running at about £3,000,000 a year and the board is confident that this figure will be greatly increased over the next few years.

Mainly because of modernization and re-equipment, Lees has not earned profits during the past three years. In the year ended July 31, 1959, there was a loss of £20,687, compared with a previous deficit of £14,419, added to which is the gross cost of £12,500 for the preference dividend. Continuity of Lees management is assured as, with the exception of Major John Lees, the present chairman, who is resigning, service agreements have been entered with all other directors.

JOHN G. KINCAID & COMPANY, LIMITED, marine engineers and boilermakers, of Greenock—Net profit for 1959 was £180,246 (£151,708) and the final dividend of 15 (12) per cent. makes 18 (15) per cent. for the year.

CHAMBERLIN & HILL, LIMITED, grey ironfounders, etc., of Walsall (Staffs)—Profit was £29,774 (£11,414), after tax of £24,758 (£13,699), and the final dividend of 11½ per cent. makes 17½ (15) per cent. for the year to March 31, 1960.

ARMSTRONG WHITWORTH (METAL INDUSTRIES), LIMITED—Final dividend of 10 (7½) per cent. makes 12½ (10) per cent. for 1959. The net profit of £224,712 (£205,618), after tax of £230,980 (£196,633), is a record for the company.

BOWTHORPE HOLDINGS, LIMITED—Final dividend of 12½ per cent. on capital increased by a two-for-three scrip issue, makes the equivalent of 18¾ (16¼) per cent. for 1959. Net profit was £375,923 (£379,256), after tax of £311,632 (£349,370).

R. HOOD HAGGIE & SON, LIMITED—Net profit for the 15 months to December 31, 1959, was £230,962 (£183,493), after tax of £126,457 (£196,561), and the final dividend of 25 per cent. makes 30 per cent. (15 per cent. and a 2½ per cent. bonus).

MITCHELL ENGINEERING, LIMITED—A controlling interest has been purchased in Barbados Light & Power, Limited, the only electricity generating concern in that territory. It is understood that the 645,576 shares were bought at 13s. 7d. each.

JOHN LYSAGHT, LIMITED, (a subsidiary of Guest, Keen & Nettlefolds, Limited)—Net profit for 1959 was £1,778,439 (£1,946,630), after tax of £1,831,154 (£1,833,980). The preference dividend takes £22,050 (£20,700) and the ordinary £1,550,000 (£1,300,000).

CAPE ASBESTOS COMPANY, LIMITED, London, W.1—A final of 15 per cent. makes 20 (17½) per cent. for 1959 on capital increased by a one-for-six rights issue. Group net profit rose from £754,266 to £944,068, of which £901,031 (£714,025) is attributable to the holding company.

BROOK MOTORS, LIMITED—Net profit for the six months to March 31, 1960, is estimated at £155,829 (£142,323), after tax of £148,588 (£118,599). Interim dividend is 5 per cent. on capital increased by a one-for-six scrip issue compared with the previous equivalent of 4⅔ per cent.

INTERNATIONAL NICKEL COMPANY OF CANADA, LIMITED—Net sales for the first quarter of 1960 advanced to $140,592,000 ($96,595,000) and net earnings rose to $24,932,000 ($16,984,000) or 85 (58) cents a share. Deliveries of nickel in all forms during the period were at a record level and at a rate greater than production.

A. A. JONES & SHIPMAN, LIMITED, manufacturers of machine and small tools, of Leicester—The chairman, Mr. F. G. Morris, states that with the exception of a mortgage loan, the business has been financed by its internal savings. In order to conserve current assets, it may be decided later in the year to issue new shares.

SERCK RADIATORS, LIMITED, (incorporating Serck Tubes, Limited) manufacturers of radiators, oil coolers, non-ferrous tubes, etc., of Birmingham—Interim dividend is maintained at 3d. a 5s. share for the year to end in July, 1960, but on a capital increased by a one-for-two scrip issue—an effective increase of 1d. a share.

MATTHEW HALL & COMPANY, LIMITED, industrial engineers, etc., of London, N.W.1—The dividend is increased from the equivalent of 15 per cent. to 27½ per cent. for 1959, on capital doubled by a scrip issue. A further scrip issue—one new for every two held—is proposed. After tax of £234,000 (£176,428), net profit was £252,231 (£201,152).

NEWMANS TUBES, LIMITED—Unless the supply of steel improves in the coming year a curtailment of production is forecast. Current orders are being met with high-cost imported supplies and any additional supplies will also cost more. Because of this, the 1959-60 profits of £184,000 must be considered exceptional, states the chairman.

KANGO ELECTRIC HAMMERS, LIMITED—Record total sales were returned during 1959 and sales for the first three months of the current year are substantially

above those of the same period last year. Mr. T. R. H. Kane, the chairman, forecasts that providing unexpected adverse trading conditions do not develop, record sales and profits will be achieved in 1960.

BIFURCATED & TUBULAR RIVET COMPANY, LIMITED—The profit for 1959 reached a record, amounting, before tax, to £483,446 (£394,116). A total distribution of 20 (15) per cent., tax free, has been approved. Plans for further expansions to the works are under way to meet the expected increased demand in the near future. Capital expenditure last year amounted to £70,000.

G. & J. WEIR (HOLDINGS), LIMITED—Group net profits were £1,256,143 (£1,123,173) and the dividend for the year is 18 (17) per cent. Viscount Weir, the chairman, states that a reduction in gross earnings for 1960 must be expected. The prospects for the shipbuilding industry remain depressing, but there are encouraging expectations of potential business on the land side.

OPPERMAN GEARS (HOLDINGS), LIMITED—Value of orders received in 1959 was about 20 per cent. higher than during 1958 and the state of the order-book at present is an all-time record, states the chairman, Mr. W. B. McCurd. However, profit margins are becoming even further reduced, he warns, and it is doubtful whether all the additional costs involved can be passed on to customers.

ROLLS-ROYCE, LIMITED—Final dividend of 7½ per cent. makes 10 per cent. for 1959 on capital increased by a 100 per cent. scrip issue and the issue of additional Workers' (1955) shares. This is equivalent to the 20 per cent. paid on the old capital in 1958. Group sales rose by nearly £1,170,000 to £96,560,000 and the net profit was £2,634,854 (£2,233,482), after tax of £2,240,000 (£2,520,000).

W. J. JENKINS & COMPANY, LIMITED, gas and mechanical handling engineers, of Retford (Notts)—Slow recovery of heavy engineering meant that the company, while not immediately short of work, had a much smaller forward order-book than it had been accustomed to enjoy during the past 10 years, said the chairman, Mr. W. Morrand Fox. A bonus of 10s. a unit is declared in the profit-sharing scheme.

KERRYS (GREAT BRITAIN), LIMITED, machinery and engineers' merchants, etc., of London, E.15—Following the annual meeting in London on May 24, there will be an extra-ordinary meeting to consider increasing the capital to £1,500,000 by the creation of an additional 2,000,000 ordinary 5s. shares. It is expected that the current rate of dividend of 13½ per cent. will be maintained on the increased capital for the current year.

HARVEY & COMPANY, LIMITED, coal and builders' merchants, of Hayle (Cornwall)—Acquisition has been completed of all the share capital of Cornish Mines Supplies Company, Limited. The acquisition has been financed by facilities provided by the company's bankers, and it is intended to issue further shares to replace these facilities, at the same time seeking a quotation for the company's shares on the Bristol Stock Exchange.

GEORGE WIMPEY & COMPANY, LIMITED—Reviewing the year's activities, the chairman, Sir Godfrey Mitchell, states that the company's output of open-cast coal, which in 1958 was 2,250,000 tons, decreased by 750,000 tons during 1959 and there would be a further reduction of about 500,000 tons this year. Owing to national policy, the work would steadily decline and the company would have on its hands a lot of heavy earthmoving equipment which was specially purchased for open-cast work.

SMITH'S STAMPING WORKS (COVENTRY), LIMITED—Interim dividend is raised from 5 per cent. to 6 per cent. for the year to July 31, 1960 (a final of 7½ per cent. made a total of 12½ per cent. for 1958-59). Output so far this year is substantially more than in the corresponding period last year and the order-book is healthy, the directors report. They add that profits are improving satisfactorily but that costs are rising and the supply of steel does not yet fully match demands being made on the company.

R. A. LISTER & COMPANY, LIMITED, agricultural engineers, etc., of Dursley (Glos)—The directors expect to recommend a final dividend of at least 9 per cent. on the ordinary capital as increased by the recently proposed one-for-six rights issue at 47s. 6d. a £1 share. A 14 per cent. total was paid for the year ended September 30, 1959 and an unchanged 5 per cent. interim is payable next month.

WILLIAM DENNY & BROS., LIMITED, shipbuilders and engineers, of Dumbarton—Work in hand is sufficient to keep shipyard and engine works occupied during the year, states the chairman, Mr. E. L. Denny, but further orders are needed soon if all departments are to be kept busy in 1961. Labour difficulties pose a more serious problem than low freight rates and excessive world shipbuilding capacity. The dividend is raised to 15 (12½) per cent. and there is a 5 per cent. special dividend on account of the financial outcome of contracts completed in earlier years.

Details of Tube Investments Bid for Raleigh

DETAILS of the offer by Tube Investments, Limited, for the ordinary stock of Raleigh Industries, Limited, have been sent to the holders. Terms of the offer, announced last month, were one TI ordinary for three Raleigh, plus 27s. 3d. cash for each Raleigh ordinary. The directors of TI expect profits for the year to July 31, 1960, to be substantially greater than those for previous years, and expect to recommend a final of at least 8¼ per cent. on the increased ordinary capital.

Directors of Raleigh strongly recommend acceptance of the offer and will accept in respect of the 84,774 shares held by them. They say that sales and profits are running in excess of those for the year ended July 31, 1959, and estimate profits for the current year at about £2,000,000. Although these results show substantial improvement on those to July 31, 1958, it should be remembered that the basis of the Raleigh business is bicycles and the maintenance of these profits by Raleigh as a separate entity should be regarded with reasonable caution, they add.

GKN Raises Dividend by 2 Per Cent.

INCREASE of £1,700,000 to £25,800,000 in group trading surplus of Guest, Keen & Nettlefolds, Limited, is reported for the 52 (53) weeks ended January 2, 1960. Following a 1 per cent. increase in the interim dividend, a similar rise in the final, to 10 per cent. makes 15 (13) per cent. for the year. Group net profit, after deductions, was £13,012,074 (£11,243,342).

The balance is raised to £13,414,174 (£11,282,667) with the surplus on realizations and tax, miscellaneous income, less written-off investments.

Summary of Indian Symposium

Pilot Plants in Metallurgical Research and Development

A symposium on Pilot Plants in Metallurgical Research and Development was held under the auspices of the National Metallurgical Laboratory, Jamshedpur, India, from February 15 to 18. The following summary of a report, made available by Dr. B. R. Nijhawan, director of the National Metallurgical Laboratory, emphasizes India's profound interest and activity in metallurgical developments.

TOP-RANKING scientists and technologists from many parts of the world attended the symposium, which was inaugurated by Prof. M. S. Thacker, director-general, scientific and industrial research. Sir Jehangir Ghandy, chairman of the executive council, National Metallurgical Laboratory, presided.

In welcoming the delegates Dr. B. R. Nijhawan said that in diverse fields of metallurgical industries, art and craftsmanship were either being replaced or supplemented by a systematic study of the basic scientific factors involved and their co-ordinated application initially on a laboratory bench and then on to pilot-plant scale. The National Metallurgical Laboratory had recognized the importance of initiating pilot-plant projects based on laboratory-scale research results with a view to the latter's implementation in industry.

The new pilot-plant bay being opened during the symposium, he said, would contain four important pilot plants such as the aluminizing of steel wire and sheets, beneficiation of low-grade Indian manganese, chrome, and other ores by ore-dressing and thermal beneficiation techniques, production of electrolytic manganese and manganese dioxide from low-grade Indian ores, and production of indigenous refractories in use in steel and metallurgical industries.

Applicability in Industry

Sir Jehangir Ghandy commended the stress laid by the National Metallurgical Laboratory in translating its laboratory-scale research results on to pilot-plant scale with a view to determining their applicability in Indian mineral and metal industries. He thanked Dr. Nijhawan and his colleagues for their valuable research and development work.

Prof. Thacker said that some of the pilot-plant scale research results emanating from the National Metallurgical Laboratory had already found translation and application in industry. He emphasized the need for industry to accept duly established and scientifically sound processes emanating from the national laboratories even though there might be a period of teething troubles.

When he opened the new pilot plant technological building of the National Metallurgical Laboratory Prof. M. S. Thacker acknowledged a gift worth over Rs. 1,000,000 of equipment to the laboratory from the British Government under the Colombo Plan.

Each day during the symposium the technical sessions were followed in the evenings by a lecture. Dr. James B. Austin, administrative vice-president of the United States Steel Corporation lectured on "Metallurgical Research in the United States Steel Corporation," Mr. E. W. Voice, assistant director of the British Iron and Steel Research Association, on "The Present and

FIG. 1.—IMPORTANT PILOT PLANTS ARE HOUSED IN THIS NEW PILOT PLANT TECHNOLOGICAL BAY OF THE NATIONAL METALLURGICAL LABORATORY.

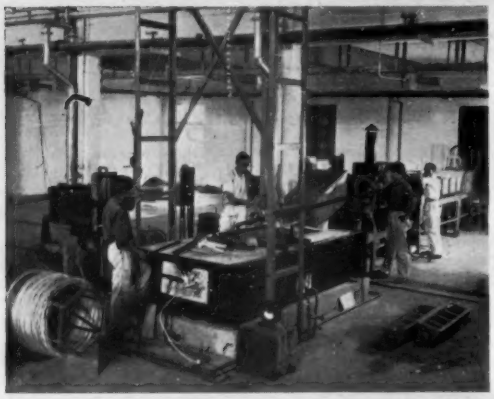


FIG. 2.—A VIEW OF THE ALUMINIZING PLANT INSTALLED AT THE NATIONAL METALLURGICAL LABORATORY.

Future Role of Sintering in Ironmaking," and Prof. N. I. Shirokov, UNESCO expert and Professor of Ferrous Metallurgy, Indian Institute of Technology, Bombay, on "Intensification of Open-hearth Process by Compressed Air."

Papers at the Symposium

Synopses of the various papers presented at the symposium follow.

"*Usefulness of Pilot Station and Plants*," by DR. H. MALCOR, president, Compagnie des Ateliers et Forges de la Loire, Paris. After considering the need for pilot-plant work in the application of the results of research the author examines in detail the various aspects relating to choice of pilot-plant capacity, translation to industrial production, technical administration problems, and liaison between laboratory and pilot-plant. A brief mention is made of the scope of full-scale pilot plants and the steps to be taken for optimum operating conditions are indicated.

"*Scope of Pilot-plant Research and Development at the National Metallurgical Laboratory*," by DR. B. R. NIJHAWAN, director, National Metallurgical Laboratory, Jamshedpur. This paper outlines the pilot-plant scale investigations currently proceeding and those under establishment at the National Metallurgical Laboratory and refers to the projected expansion in these fields during the Third Plan period. Reference is also made to the low-shaft pilot plant now in operation for the production of iron using non-metallurgical sub-standard grades of coal and to other plants for the electrolytic production of manganese and manganese dioxide, mineral and thermal beneficiation of ores, aluminizing of steels, production of standard ferro-alloys, refractories and magnesium. It is observed that the progress so far has been steady and rewarding.

The paper concludes with a reference to some aspects of pilot-plant investigations in iron and steel technology and industry, such as smelting of iron and ferro-alloys in low-shaft furnaces, oxygen and side-blown converter steelmaking techniques, continuous casting of steel, steel plant refractories, etc., in relation to current and projected research and development work at the National Metallurgical Laboratory.

"*The Uses and Limitation of Pilot Plants in Studying Ironmaking Problems*," by E. W. VOICE, assistant director, British Iron and Steel Research Association, London—Pilot plants are simple for some processes, *e.g.*, sintering, because there is no scaling involved. Other processes, such as the blast furnace, do involve scaling and, in general, it is impossible to preserve complete similarity between the model and the full scale. These problems are discussed in this paper from theory and practice and details given of certain pilot plant studies carried out by BISRA.

"*The Development of a Steel Industry—Factors Affecting the Economics of Steel*," by M. D. J. BRISBY, chief engineer, W. S. Atkins & Partners, consulting engineers, London—The part played by steel in a country's economy is discussed. World statistics are reviewed and reference is

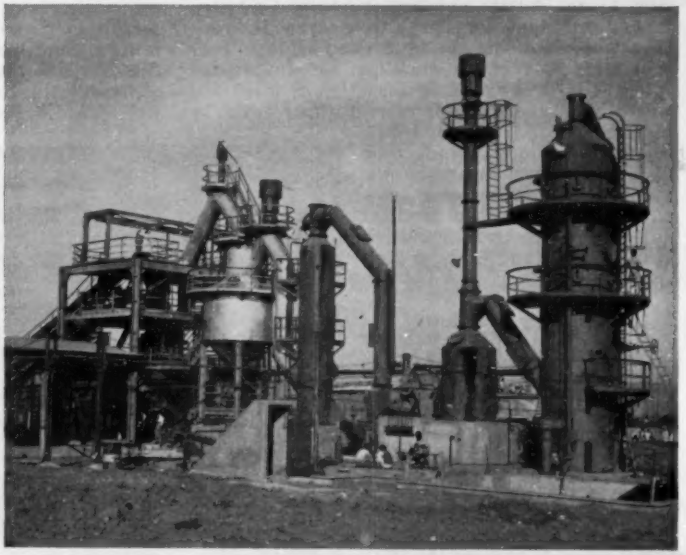


FIG. 3.—THE NATIONAL METALLURGICAL LABORATORY'S 15-TON/DAY LOW-SHAFT FURNACE PILOT PLANT.

made to the main steel producers of the world and to their apparent consumption of steel. The resources for setting up a steel industry are considered and questions relating to demand and raw material requirements are discussed. The pattern of steel growth in the older industrial countries and in the newly industrializing countries is studied and examples are given of the range of products wanted to suit different national economies.

The author discusses the vital question of the siting of steelworks and suggests how various steel products could best be produced. This is intimately connected with the question of the economic size of plant. Typical examples are given of optimum size modern works, intended to give minimum operating costs.

The problems associated with the layout of works are briefly reviewed and the author suggests a trend for the works of the future. The capital investment requirements associated with different types of steelworks are given, together with examples. The returns which can be expected from the capital investments schemes discussed are considered.

"*Metallurgical Pilot Plants: Theory and Practice*," by M. J. SHAHANI and DR. T. BANERJEE, National Metallurgical Laboratory, Jamshedpur—In this paper, theory and practice of designing metallurgical pilot plants are reviewed. In particular the usefulness of similarity principles in scaling-up equipment either from the bench scale to the pilot plant or from the pilot to the full-scale prototype is discussed. Reference is made to the utilization of scale-up tools such as differential equations, dimensional analysis, analogy approaches, and models.

The importance of dimensionless groups and their applications in the development of metallurgical process equipment is emphasized by actual examples pertaining to small shaft furnaces and pilot converters. References to small-scale electric arc furnaces and model open-hearth furnaces are also cited. A list of dimensionless groups and a classified bibliography of the literature on pilot plants and allied techniques used in scale-up practice are included in an appendix.

Best Size of Pilot Plant

"*The Relationship of Pilot Plants to Full-scale Operation*," by DR. D. SWARUP and PROF. G. REGINALD BASHFORTH, Banaras Hindu University, Varanasi—The authors, whose chief interest in pilot plants is as a means of practical instruction, review various factors which affect the relationship of the results obtained on pilot plants to those which may be anticipated in full-scale operation. In some cases there is a reasonable relationship between pilot-plant work and the results of full-scale operation, but in other cases the reduction of plant size necessitates a corresponding reduction of particle size, whereby the physical properties of the raw materials may be altered, introducing conditions differing from those encountered in full-scale tests. When studying thermal processes, the increased radiation and conduction heat losses may very adversely affect the results of small-scale trials.

The authors suggest that perhaps the best size of a pilot plant is one that can be operated on a commercial basis and recommend a small commercial iron and steel making unit, which would not only serve as a medium for training personnel, but could also be operated commercially in certain localities. It is not suggested that this type of plant, which consists of a 10-ft. dia. hearth, hand-charged blast furnace, and basic-lined, side-blown converters capable of an annual production of 126,000 ingot tons, should replace the larger capacity, integrated iron and steel plants. Plants of this type could be erected at a much lower capital cost per ton of annual output, and could employ lower-grade raw materials peculiar to certain districts of India. These plants could be designed and erected by Indian personnel using Indian materials, thereby conserving foreign capital.

Pilot Plants in the USA

"*Role of Metallurgical Pilot Plants in US*," by H. G. IVERSON, chief, branch of ferrous metals and ferro-alloys, Bureau of Mines, US Department of Interior, Washington, DC—In this paper, the author has discussed the role of metallurgical pilot plants in the United States, particularly with reference to the production of ferrous metals and ferro-alloys at the Bureau of Mines, Washington, but also to the general technology and practice followed in metallurgical pilot plants in the United States at other centres.

"*Pilot Plants in Pyrometallurgy*," by DR. N. BOOTH, managing director, British Oxygen Research & Development, Limited, London—Pilot plants are widely used with advantage in the chemical and petroleum industries. Their advantages and disadvantages in the development of pyrometallurgical processes are described. The factors that need to be taken into account in deciding the size, the location and the design of the pilot plants are discussed. In pyrometallurgical processes both thermal and chemical considerations have to be borne in mind and this raises a number of special features which are described, examples being taken from processes on which British Oxygen Research & Development has worked.

"*Pyrometallurgical Pilot Plants*," by DR. A. B. CHATTERJEA, assistant director, National Metallurgical Laboratory—References are made to the desirability and fruitfulness of pilot-plant scale investigations in terms of some current revolutionary changes in iron and steel making while retaining the essence of physico-chemical reactions involved. Outline references have been made to pilot-plant investigations on the utilization of sub-standard grade raw materials for iron-making, such as, for example, in low-shaft furnaces that have contributed to the establishment

of industrial units, a noteworthy installation discussed being that at Calbe, East Germany.

This is followed by references to oxygen steelmaking methods which have received considerable attention and are revolutionizing steelmaking technique. It is concluded that pyrometallurgical pilot plants can make an immense contribution on the development of hitherto unknown metallurgical processes, and therefore merit installation.

"Some Aspects of Pilot-plant Research and Development in Iron and Steel Industry," by DR. B. R. NIJHAWAN, director, National Metallurgical Laboratory, Jamshedpur—Reference is made to (i) recent developments in iron and steel making based on pilot-plant scale trials carried out in different parts of the world; (ii) work on oxygen enrichment of air-blast in the iron blast furnace and its applications are referred to including a current investigation in Japan on feeding back clean blast-furnace gas into the furnace hearth zone along with heavy oxygen enrichment of cold, unpreheated air-blast; (iii) developments in converter steelmaking, including side-blown basic converter technique of steelmaking for medium-phosphorus irons; (iv) pilot-plant scale investigations in related fields in the UK and the USA; (v) continuous casting and consumable electrode vacuum melting. It is concluded that there is a vast scope for pilot-plant investigations in the iron and steel industry.

LD Converter Installation

"LD and Side-blown Converter," by K. N. GUPTA and B. PRAKASH, College of Mining and Metallurgy, Banaras Hindu University, Varanasi—The 2-cwt. capacity LD-converter installation at the Banaras Hindu University is described. The pig-iron is melted in a 10-cwt. capacity cupola and is transferred, at a temperature of 1,300 deg. C., to the converter which, owing to the large radiation and conduction losses, has to be preheated to at least 400 deg. C. Details of operation are given.

It was found that the pressure of oxygen impingement and the slag thickness controlled the relative rates of carbon and phosphorus removal. With favourable slag conditions good desulphurization was obtained. The experiments demonstrated that the process not only permitted the production of steel to any specification, including the catching of the carbon on the drop, but that the process could be employed to dephosphorize Indian pig-iron, without excessive decarburization, thereby producing an iron suitable for the manufacture of ingot moulds, rolls, and similar products.

Experiments using a 3-cwt. capacity, basic-lined, side-blown converter demonstrated that similar results could be obtained and that this apparatus gave a greater degree of control and possessed the advantage of a larger heat increment due to the conversion to carbon dioxide of most of the carbon eliminated.

"Steel Melting in a Pilot Plant Shaft Furnace," by J. W. EYRE, United Steel Companies, Limited, Sheffield, and DR. C. HULSE and PROF. M. W. THRING, Department of Fuel Technology and Chemical Engineering, University of Sheffield.—An experimental furnace has been built, capable of melting pig-iron-scrap mixtures at the rate of 10 cwt./hr. No difficulty was experienced with 100 per cent. pig-iron; some bridging occurred with pig-iron-scrap mixtures, the severity of the bridging increasing as the percentage of scrap in the charge was increased. The high thermal efficiencies obtained suggest that in a production unit these could easily reach 70 per cent. Varying carbon content of the product was obtained; dephosphorization by the addition of lime to the bath was shown to be practicable. Initial difficulties due to refractory erosion were largely overcome.

Investigations in Essen

"Pilot Plants in Metallurgical Research of Fried. Krupp, Essen," by DR.-ING. H. KRAINER, Director, Central Research Department, Fried. Krupp, Essen, West Germany.—Pilot plants used by the Central Research Department of the Fried. Krupp Company in Essen for investigation of both "iron-ore reduction processes outside the blast furnace" and "oxygen steelmaking" are described. The ore-reduction project preferentially makes use of rotating furnaces for research on basic metallurgy as well as on technical developments of the Krupp Renn process and the Krupp sponge iron process. A series of small, electrically heated rotating furnaces working batchwise and at constant temperature is available for preliminary experiments. The next stage is represented by a rotating furnace, of 6.5 m. length, which works continuously. Ample measuring devices are provided to investigate the metallurgical reactions. As a third stage, a 14-m. rotating furnace is used working at a semi-production scale and yielding data on furnace operation and throughput, which, may be evaluated for production conditions by up-scaling. This furnace is also suitable for investigations of other processes such as sintering, roasting, volatilization, etc.

The pilot plant is further equipped with sufficient instaliations for pre-treatment of the material to be reduced (crushing, sieving, pelletizing, etc.) and also for grinding, sieving, classifying, magnetic separation, etc., of the furnace products. For oxygen steelmaking, mainly by the LD process, a pilot plant has been put into operation consisting of a 3-ton converter for refining pig-iron, which is given the desired composition by means of a rotating smelting furnace. The converter is equipped with all necessary measuring instruments including an automatic and continuous device for recording the temperature of the melt. Test runs show good reproducibility of the results.

"Proposed Pilot Plant for Production of Sintered Beryllium Oxide from Beryl Ore," by N. SRINIVASAN and DR. G. S. TENDOLKAR, Atomic Energy Establishment, Trombay, Bombay.—The

proposed pilot plant will treat about 150 kilos of beryl ore and will produce 9 kilos of sintered beryllia bricks per day. The plant will help in the evaluation of the equipment performance and operation from the point of view of producing a nuclear pure material and will give valuable experience of handling toxic materials.

"Pilot Plants for Agglomeration of Iron Ores on a Semi-industrial Scale," by DR. H. RAUSCH, Lurgi Gesellschaft für Chemie und Huttenwesen M.B.H., West Germany, and F. CAPPEL, Lurgi Gesellschaft für Chemie und Huttenwesen M.B.H.—Tests on a semi-industrial scale and testing methods for the agglomeration of iron ores are the subject of critical comments. For the performance of sinter tests, semi-industrial sinter pans and semi-industrial sinter strands are utilized. The pan tests furnish particulars on the output, fuel consumption, amount of return fines, etc. Other factors such as influence of feeding the mixture on to the sinter strand, ignition, gas circulation, etc., can be ascertained by continuous sinter strand tests.

The results of such tests can definitely be applied to industrial plants. Difficulties arise if conclusions are to be drawn on the behaviour of the agglomerate in the blast furnace. These difficulties are discussed in detail. There are still other testing methods which help to overcome these difficulties. These methods include softening of agglomerate under pressure, observation of agglomerate under the microscope at high temperature, determination of porosity and degree of oxidation, etc. By means of a chemical analysis the composition of the agglomerate can be ascertained, but often not the nature fo the chemical combinations.

Difficulties with Pelletizing

Similar difficulties arise with regard to pelletizing. For this process pan tests and sinter strand tests are also performed. The testing methods pertain to green, dried, and burnt pellets. These tests consist of compression strength tests, drop tests, compression strength tests at high temperature, measurements of porosity, observation of agglomerate under the microscope at high temperature as well as chemical and mineralogical investigations.

"The Role of the Pilot Plant in Iron-ore Sintering," by DR. A. GRIEVE and F. ELY, Huntington Heberlein & Company, Limited, Stockport.—The Huntington Heberlein experimental sintering laboratory has a complete pilot sintering plant with many items of ancillary equipment used in the experimental procedure. These test facilities and the proposed future developments are described. The advantages and limitations of small-scale sinter tests are discussed in relation to plant design and the development of new sintering techniques. Some examples illustrating the application of this type of test work are given.

"The Role of Pilot-plant Investigations in the Development of Updraught Sintering of Broken Hill Lead Concentrate," by D. H. HART, technical assistant to the manager, Broken Hill Associated Smelters Pty., Limited, Port Pirie, Australia.—In the sintering of lead concentrate at the Broken Hill Associated Smelters Pty., Limited, Port Pirie, sulphur dioxide is produced in the offtake gases. Enrichment of this gas to the strength necessary to make sulphuric acid in a contact plant proved difficult with the 10-ft. wide downdraught Dwight Lloyd sintering machines. Laboratory-scale tests indicated that reversal of the air-blast and roasting by updraught could overcome many of the difficulties previously experienced. This principle was further tested on the pilot-plant scale and the experience gained at this level was used in the design of a full-scale updraught machine which is now in successful operation.

Japanese Experiments

"Experiments on Blast-furnace Operation in Yawata Iron and Steel Works," by DR. K. WADA and A. HONDA, Yawata Iron & Steel Company, Limited, Yawata, Japan.—After a series of fruitful campaigns extended over a period of 10 years the experimental blast furnace of 3 tons per day capacity at the Yawata Iron and Steel Works was blown out in 1954 and rebuilt as an experimental low-shaft furnace and various tests were undertaken. Another experimental blast furnace of 250 kg./day capacity has been in operation since early 1957, carrying out trials on diverse problems including those relating to physical and chemical aspects of the reactions in the furnace. A summary of the results of these trials and a few problems of ironmaking now under investigation are given.

"Recovery of Vanadium Pentoxide from Vanadium-bearing Titaniferrous Magnetites," by B. K. AGARWAL, M. P. MENON, and P. P. BHATNAGAR, National Metallurgical Laboratory, Jamshedpur.—The layout and outline of the process proposed for operation on pilot-plant scale for daily treatment of a ton of vanadium-bearing titaniferrous ores for the recovery of vanadium pentoxide are furnished. Possibilities of investigations related to the recovery from other residues of some metallic values in this pilot plant are referred to. Results of laboratory-scale investigations in the above fields are also outlined.

"Hot-dip Aluminizing of Steel Wire—Laboratory-scale Investigations and Pilot-plant Studies," by A. N. KAPOOR, P. K. GUPTE, and DR. B. R. NIJHAWAN, National Metallurgical Laboratory, Jamshedpur.—Research investigation work on hot-dip aluminizing of steel underway at the National Metallurgical Laboratory has resulted in the development of hot-dip methods based on treatment in molten flux, aqueous flux, organic, and resinous fluxes as a prerequisite to hot-dipping in molten aluminium containing suitable additives to yield adequate thickness of aluminized layer, minimum formation of inter-metallic brittle alloy layer, and maximum adhesion of the aluminized layer to the steel base.

While these processes have given useful results on a laboratory scale both in respect of wire and small sheets, their industrial-scale implementation can-

not be undertaken until pilot-plant trials have determined not only the applicability of research results already obtained on a much larger scale but also solved certain mechanical features, such as uniform travel of steel wire from one end of the cycle to the other without breakage, warpage or distortion at optimum speed of feed wire balancing with that of outgoing aluminized wire whilst attaining the requisite thickness and uniformity of aluminized coating.

The necessity of substituting aluminizing in place of galvanizing is now well established for many applications requiring corrosion resistance under hot, tropical environments apart from the typical situation in India where there is a conspicuous lack of metal zinc resources in comparison with the far more abundance of aluminium. The present work refers only to aluminizing of steel wire at this stage, but it is proposed to install a similar installation for the aluminizing of steel strips.

Refractories Pilot Plant

"*Development of Metallurgical Refractories with Indian Raw Materials—Pilot Plant Studies*," by T. V. PRASAD and H. V. BHASKAR RAO, National Metallurgical Laboratory, Jamshedpur.—The need for a refractories pilot plant at the National Metallurgical Laboratory for translating the laboratory-scale research results into industrial-scale implementation is stated. A description of the refractories pilot plant being set up at the National Metallurgical Laboratory is given. Some of the chief functions and scope of the pilot plant, such as scaling up of laboratory data, study of diverse variables involved on pilot plant scale relative to optimum production *vis-à-vis* inherent economics, and metallurgical requirements of the products, are discussed.

"*Production Manganese and Manganese Dioxide—Pilot Plant Investigations*," by N. DHANANJAYAN, H. K. CHAKRABARTI and DR. T. BANERJEE, National Metallurgical Laboratory, Jamshedpur.—This paper outlines the operation of pilot-plant production of electrolytic manganese and manganese dioxide at the National Metallurgical Laboratory. A flow sheet presented schematically depicts the main operation involved. The manganese metal obtained analysed 99.95 per cent. manganese and manganese dioxide obtained contained about 90 per cent. manganese dioxide with traces only of impurities. The manganese metal has been used in National Metallurgical Laboratory research work on stainless steels, manganese based coinage alloys, brasses, bi-metals, etc., with satisfactory results. Manganese dioxide has shown satisfactory performance in dry cells.

Excepting some specialized items, the work of fabricating, assembly, and installation of the plants has been done at the National Metallurgical Laboratory.

"*Pilot-plant Studies on Production of Metallurgical Coke*," by N. N. DAS GUPTA, N. N. CHATTERJEE, and M. V. P. MENON, Central Fuel Research Institute, Jealgora, Dhanbad.—In spite of the great advancement made in recent years on the studies of coal structures, the exact mechanism of coke formation still remains obscure. Investigations in the blending and coking of coals have therefore to be carried out, more or less, on a trial-and-error basis. Because of the difficulty and cost involved in carrying out such exploratory tests in commercial ovens various small-scale laboratory tests and semi-commercial scale pilot plants have been used from time to time. In spite of their limitations, such pilot ovens have proved invaluable for obtaining a preliminary knowledge of the coking properties of coals from different sources and their blends for studying the influences of different carbonizing conditions on the quality and quantity of the coke and the by-products.

A short description is given of different types of pilot ovens which are in use in different countries. Data are presented of comparative tests done in pilot and commercial ovens on various Indian coals and their blends.

"*Coal Washing Pilot Plants at the Central Fuel Research Institute, Jealgora, India*," by S. K. MAZUMDAR, G. G. SARKAR, A. K. CHAKRABARTI, and DR. A. LAHIRI, Central Fuel Research Institute, Jealgora, Dhanbad.—A number of coal washeries will be set up in the near future to meet the specific demands of steel plants, railways, and chemical industries. In addition to laboratory-scale investigations, pilot-plant trials are necessary for planning such washing plants. Several coal-washing pilot plants, including a 40 t.p.h. composite washery, have been set up at the Central Fuel Research Institute to carry out tests on coals of various sizes and their washing characteristics. This paper briefly describes these pilot plants and indicates the scope of their use in relation to various coal-washing problems.

Case Histories

"*Examples of the Use of Pilot Plants to Obtain Engineering and Economic Information Needed for Process Industrialization*," by JOHN W. PAYNE, senior scientist, Socony Mobil Oil Company, Inc., Paulsboro, New Jersey, USA.—The author presents a number of case histories of the pilot-plant development of processes and attendant equipment from the glassware scale to industrialization. These descriptions focus on the mechanical and thermal aspects of the developments rather than on the effects of process variables. Stress is placed on what information was needed from the pilot plants to assist in the design of industrial plants and to assess the economics of the process. Most of the developments described have been or are now in wide industrial use in the petroleum industry.

"*Production of Reducing Gases from Petroleum Products by the Shell Gasification Process*," by L. W. TER HAAR, process development engineer, Bataafse Internationale Petroleum Maatschappij N.V., The Hague, Holland.—Describing the mechanism of the Shell oil gasification process,

which is of the continuous non-catalytic flame type, the author also reviews its modifications, ranging from gasification with oxygen at high pressure to gasification with air at slightly over atmospheric pressure. A survey is given of the economics of the production of gases of different qualities and for different applications. The author suggests that gas of low cost, as obtained by gasification with air, will find application in the magnetic roasting of low-grade hematite iron ores and discusses whether such low-cost gas, characterized by a high content of inert material, can also be used economically in direct reduction to sponge iron, in which process only a limited use of heat exchange seems to be possible.

"*Continuous Casting Development for Steel*," by I. M. D. HALLIDAY, head of continuous casting research and consultant of continuous casting, United Steel Companies, Limited, Sheffield.—Present-day pilot and production plants are reviewed, as are general features of the process and its advantages. Development trends in multi-stranding, metal pouring, solidification rates, and mould design are then considered, and particular attention is given to different mould operations. Practice at Barrow for casting small billets, large slab and bloom sections at high speeds in killed and rimming steel is described. The future trend towards higher performances is stressed.

India Adheres to Original Steel Target

EVEN though India may not achieve her steel production target of 6,000,000 tons during the second Five-Year Plan, she will adhere to the original target of 10,000,000 tons to be reached during the Third Plan, it is announced. Mr. Nehru has said that output would be augmented by the establishment of a new plant at Bokaro, in Bihar. The three existing plants in the public sector would be expanded to increase output to 8,500,000 tons during the period, with the balance of 1,500,000 coming from the Bokaro plant, which may receive support from the Kaiser Steel Corporation, of California.

But Mr. Nehru said that the Government would welcome any "feasible scheme" for small-scale steel production by the private sector. "I want as much competition between the private and public sectors as possible," he added.

Planning Commission's Views

The Planning Commission of India, however, is said to have favoured a reduction in the coal and steel targets in the Third Plan. The working groups' original targets were 110,000,000 tons of coal and 10,000,000 tons of steel, but the Planning Commission is wanting these totals reduced to 90,000,000 tons of coal and either 8,000,000 or 9,000,000 tons of steel. The possibility that the Second Plan targets will not be reached is believed to have influenced the commission.

Iron-ore producers in Malaya are perturbed at the news that Japan has signed an agreement to import 4,000,000 tons of ore a year from India. Industrial sources in Kuala Lumpur said they hoped that this comparatively large amount would not be used to depress the prices of imports from other areas.

One spokesman said: "As a country which has to import all her raw materials for the steel industry, Japan is looking for the cheapest ore she can get."

For several years, Malaya has contributed about 30 per cent. of Japan's ore imports, which this year are expected to rise by 1,500,000 tons to 11,700,000 tons. The agreement between Japan and India is effective for 15 years in the first instance from the middle of 1966. A project at Bailadilla, where the ore will be mined, is to be developed with Japanese collaboration. Five major steel manufacturers of western Japan have entered into a five-year contract for the purchase of 3,000,000 tons of iron ore from Goa over a period of five years.

Exports to Britain?

Western Germany now imports about 20,000 tons of steel slabs annually from India. There are also indications that Britain may start importing this variety of Indian steel. India's marginal exports to these countries have become possible because she has no mills so far capable of rolling the heavy slabs from steel ingots produced at Bhilai and Rourkela. Large imports to India of finished steel both from western Germany and Britain still continue.

According to Mr. C. Subramaniam, Finance Minister, Madras State, tests conducted on the suitability of lignite for smelting iron from iron ore at Salem may lead to the establishment of an iron plant in the State. But he added that the preparation of a scheme would depend on the advice of experts. Large-scale tests would be carried out by early next year.

The Government of Mysore has passed orders converting the Government-owned and managed Mysore Iron and Steel Works at Bhadravati into an independent corporation with an authorized capital of Rs. 200,000,000 and an issued capital of Rs. 120,000,000, held by the Mysore Government.

The formation of the corporation will enable the State Government to secure maximum assistance from the Government of India for expansions at the works.

Nearly 1,200,000 tons of iron ore will be bought by Czechoslovakia from India under a recent contract.

The rapid expansion of the Czech metallurgical industry, it is believed, provides great scope for a further increase in the export of ore to Czechoslovakia, which, after Japan, may become India's best ore customer.

Materials Handling and Sintering Plant

DESIGN and construction of a materials handling and iron-ore sintering plant at the Carlin How (Yorks) works of the Skinningrove Iron Company, Limited, is to be carried out by Head Wrightson Iron & Steel Works Engineering, Limited, a subsidiary of Head Wrightson & Company, Limited, Thornaby-on-Tees.

The plant is designed to produce ultimately 7,000 tons per week of self-fluxing blast-furnace sinter from a mixture of imported and home ore fines. Total value of the work involved is approaching £700,000.

Incorporated in the plant will be equipment for feeding and controlling automatically the proportions of raw materials, limestone handling equipment, a coke-grinding mill, raw materials mixing equipment, a continuous sintering machine with all ancillaries, a forced draft sinter cooler, and conveying equipment both for raw materials and for delivering the sinter to the existing blast-furnace bunkers.

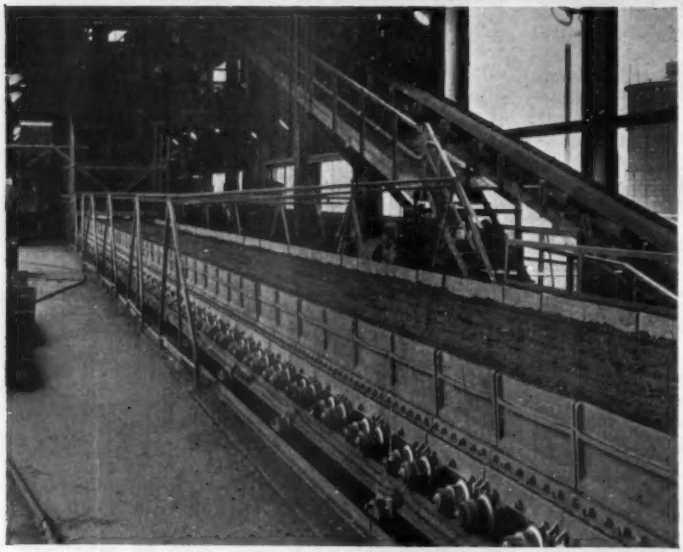


FIG. 1.—SINTER PLANT INSTALLATION TYPICAL OF THE TYPE OF EQUIPMENT TO BE SUPPLIED TO THE SKINNINGROVE IRON COMPANY.

The Skinningrove order follows the contract recently placed with Head Wrightson for a similar, but somewhat larger, plant at the Clyde Iron Works of Colvilles, Limited.

NEW ZEALAND GOVERNMENT has signed a contract with the Banno Trading Company, Japan, for the sale of 40,000 tons of coking coal for £220,000. In exchange, the Japanese firm may export approved goods to New Zealand to the value of £1 for every £2 paid on the price of coal.

Carriage of Methane by Sea

METHANE transportation by sea was considered by Dr. E. C. B. Corlett and Dr. J. F. Leathard in a paper presented to the Royal Institution of Naval Architects in London on March 24.

According to the authors, the only materials suitable for the construction of a liquid methane tank are those metals which do not become embrittled by passing through a transition range when attaining the working temperature. Certain ferrous alloys, with high nickel and chromium content, are suitable, while other groups of non-ferrous alloys, particularly those based upon aluminium, are a possibility. Additional requirements are that the material should weld satisfactorily, that established welding techniques and equipment should be available, and that the cost should be reasonable.

An example of a nickel/chrome steel is the US alloy ASTM A-353. This alloy appears to show little sign of loss of properties in the parent metal at the temperature of liquid methane, but, adjacent to a weld, there appears to be a substantial fall in energy absorption as measured by the Charpy test.

The most suitable aluminium alloys are those of the non-heat-treatable type, such as generally adopted for shipbuilding. Considerable test work has been carried out on these aluminium/magnesium alloys for low-temperature use. It is considered that the most suitable alloy is that having a magnesium content of 4 to 4½ per cent., such as the British Standard NP 5/6 specification for plate.

Based upon current estimates for the two metals, it appears there would be little to choose between the cost of materials for the methane tanks. The cost per ton of steel is rather over half that of the aluminium, but the weight ratio between the two tanks would be of the order of 2:1 in favour of the aluminium alloy. Fabricating costs for the steel tanks might be higher due to the greater weights involved, and also that heat-treatment after welding may be necessary. Thus, it is likely that there may be a cost bias in favour of the aluminium tank. Similar special welding techniques would be required for both materials.

Heat-treatment Practice Conference

Organized by the British Iron and Steel Research Association, a conference on heat-treatment practice will be held at Harrogate on July 5 and 6. The main aspect of the subject to be considered will be "carburizing," the various papers ranging over the theory and practice of carburizing and the properties of carburized steels. Full details and registration forms are now available from the Technical Secretary, Metallurgy (General) Division, British Iron and Steel Research Association, 11, Park Lane, London, W.1.

THE MINING MACHINERY INDUSTRY LOOKS AHEAD

By A. YORKE SAVILLE, M.I.Mech.E.

Development of mining machinery is a continuous process, and opportunities exist of applying the knowledge and experience gained over the years. Nevertheless, the mining machinery industry faces a formidable future. In this paper, presented to the Scottish Branch of the National Association of Colliery Managers and the Association of Mining and Mechanical Engineers in January, 1960, the author, who is president of the Council of Underground Machinery Manufacturers, discusses the trends and the development factors in the production of mining machinery.

MR. A. YORKE SAVILLE

THE mining machinery industry in this country is a small but vigorous collection of firms with a refreshingly independent outlook. Although organized for certain purposes, the various companies in the industry pursue their own ways in a spirit of truly healthy competition. The manufacturers and users of mining machinery products are in agreement that that is the right way to do business.

In the first hectic 10 years of the National Coal Board's existence the mining machinery industry had a terrific challenge to meet. With due modesty it may be said that this challenge was met.

The Olympia Exhibition

In July, 1959, an exhibition was staged at Olympia, London, which was in reality the shop-window of the mining machinery industry. Organized by the Council of Underground Machinery Manufacturers, the exhibition embraced the products of more than 100 firms. Equipment for both coal and metal mining was represented and ranged from small electrical components to massive coal-winning machines and conveying equipment. Equipment worth more than £1,000,000 was on view and more than 4,000 h.p. was connected to the electrical system at Olympia, which incidentally, had been boosted for the exhibition.

Undoubtedly, this was the most comprehensive display of its type ever staged in Great Britain. It was possible to study under one roof all the latest types of underground machinery and roof support equipment.

The number of visitors was extremely satisfactory, being several times greater than that of the previous exhibition in London during the summer of 1949. Furthermore, no effort was spared by the CUMM to invite oversea visitors and the response was most gratifying.

Membership of the council does not include all manufacturers of mining equipment. Its members are drawn from firms who concentrate their attention on the design and manufacture of equipment for drilling, winning, and conveying coal, and also for providing modern forms of roof support. The main function of the council is to represent the mutual interests of member firms when dealing with the NCB, the Ministry of Power, and other Government departments. The council does not in any way represent a price ring; its members sell in a highly competitive market. The council is really more a professional organization than a trade association, and it is a body which can deal with technical problems which concern its members in a general way.

Although the exhibition served as a reminder in respect of equipment available for use both on the surface and underground at a mine, by the terms of reference, the manufacturers were debarred from showing the contributions which they make purely for other industries. For example, member firms are concerned with specialized material handling equipment, with a wide range of sizing plant, massive power presses, and earth-moving machines, to mention but a few. These other activities are invaluable and lead to a greater degree of flexibility, and, indeed, experience, which is always of paramount importance.

Thus, in a broad sense, manufacturers are concerned with three markets, which may be summarized as follows:—(*a*) Mining of all types (home); (*b*) mining of all types (export); (*c*) industrial (home and export).

For the purpose of this paper only the home and export markets for equipment which embraces the requirements of both coal and metal mining industries are considered.

The mining machinery industry is not very old, although a few primitive machines were introduced

over 100 years ago. During the early years the rate of progress was slow, but the tempo increased at the turn of the century and since the second world war the development has been spectacular. Certainly, the plant displayed at Olympia in 1959 had a very different appearance from that shown at the previous exhibition at Earls Court in 1949. The changed situation was brought about, at least in part, by the shortage of coal after the war and the urgent need for equipment from both home and export markets.

Mining Conditions in Britain

Mining conditions in Britain are probably more difficult and varied than any in the world. Conditions cover thick seams, thin seams, steep gradients, heavily faulted areas, wash-outs, bad roofs, gas, spontaneous combustion, and water. More fortunate mining engineers in other countries where conditions appear to be almost ideal are sometimes envied, but the problems in this country are, without doubt, a blessing in disguise.

By necessity, developments have been versatile and many problems have been resolved one by one. This has stood the mining machinery industry in good stead so far as export markets are concerned, for seldom is it found that oversea conditions are more difficult than those which have been successfully dealt with in this country. Yet there is no room for complacency. Many problems remain to be solved and many improvements undoubtedly can, and will, be made to existing systems and equipment.

For many decades, British manufacturers have enjoyed a worthwhile export business, not only in Europe, but throughout the Commonwealth and other territories. The increased tempo of mechanization has resulted in visits by mining engineers from virtually all parts of the world to Britain, while British manufacturers have been active in studying oversea requirements and investigating underground conditions in relation to their new types of equipment.

Development Factors

How can the industry look ahead, both in regard to home and export requirements? In the broadest sense, wise and careful development is the key. A machine may be produced to fill a definite need which market research has shown to exist. In some cases this may prove to be a simple development, or, in others, a most complex one. On the other hand, a system or a machine may be devised and then mining engineers must be convinced of its usefulness.

It is seldom that the products of the mining machinery industry hit the headlines. The general public is not concerned about the means of production. But, as far as coal is concerned, the public is certainly interested in quality and price. Nor does fashion make the same impact on mining as it does in other industries, although an outstandingly successful machine or mining system may well cause a fashion to develop, and, of course, there have been a number of instances of this nature in recent years.

The design of mining equipment presents problems that are in many ways unique. Designers must always have before them the problems of limitation of space, coupled with the need for robust construction and accessibility for routine maintenance.

Unlike many products in the engineering field, few items of mining equipment can be developed basically in the laboratory, or, indeed, on the factory test-bed. The only real proving ground is in the mine itself. Therefore, it is necessary to select carefully the site for the prototype tests. In the case of a mining machine, for example, conditions must be chosen which are not so difficult that failure may cause a promising design to be abandoned, nor so easy that high hopes are raised unjustifiably.

Operating conditions underground cannot be predicted at all times. For example, the hardness of the coal may vary widely along a relatively short length of coal face; indeed, changes may be apparent from day to day. The direction of cutting may well influence the position. Herein lies one important difference in the development of coal-face machinery as compared with that of equipment such as, for instance, a machine tool. In this latter case working conditions are the same day by day and the characteristics of the material on which work is to be done can be carefully controlled.

In general, the system of mining will determine the type of plant which is developed in the country concerned. In Britain, for example, the emphasis has been on equipment for longwall working, and thus compact design has been a key factor. Despite this, many outstanding machines have been developed for room-and-pillar work, the sales being, for the most part, to the export market. In America, on the other hand, development has been almost exclusively on room-and-pillar lines, the emphasis being on the mobility of plant.

Apart from the basic system of mining employed, the nature of the coal may well play an important part; thus, for the softer seams of the Continent, coal ploughs have been developed and, more recently, these have been applied with considerable promise to suitable conditions in Britain. Conversely, British power loaders have been installed satisfactorily in the harder continental coals.

Changes in Demand

The designer must always have his sights trained on market requirements. He must not only be familiar with present demands but must also do his utmost to forecast future trends. For example, in Britain and in many other countries, too, the demand for many years has been for coal and more coal. Output being the main concern, the size analysis of the product was of secondary importance. The position has changed and the customer is "calling the tune."

Large coal has always commanded a high price, the domestic, railway, and export markets all

demanding this class of product. Although the position is changing quite appreciably, the price differential in favour of large coal still remains and may continue, but on a reducing scale, for a few years. Another factor, however, is assuming even greater importance; that is the need to minimize the amount of fines in the product as mined. This is of particular importance when washing plant is in use. The position, for the present and immediate future, is quite apparent—the designers of coal-winning machines have a clear-cut problem. Conveyor designers also must strive to minimize degradation between the coal face and the mine car or pit shaft.

The future of the mining machinery industry is linked with a realistic and clearly-seen development programme. Certain types of equipment will, of course, enjoy a steady demand for some years, but a vigorous and ably-directed development programme is an absolute essential for the continued success of the mining machinery industry.

The Process of Development

Although development embraces a very wide field in itself, it is possible to classify development work under four general headings:—

(1) Detailed changes of a component part in respect of design, or material, or both.

(2) A new unit which will form part of an existing machine, as, for example, the substitution of a continuously rated motor for a 1-hr. rated motor in a coal-winning machine.

(3) Enlarging or scaling down an existing and well-proved design in order to extend the range of a product.

(4) A machine utilizing a completely new principle or novel application of an existing principle. Examples might relate to a coal-winning machine or one to dispose of ripping debris.

In order to form a broader picture, it may be helpful to consider each class of development in greater detail.

Modification.—It may well be that only after a considerable number of machines of any type are at work that weaknesses—large or small—in the design may become apparent, and it may be necessary to take action by changes in design detail or in the class of material used. Further, when the product is in actual production it may be found that certain modifications may simplify manufacturing methods and so reduce costs.

If alterations are made, interchangeability of components must be closely watched. During the life of a product, material changes in line with up-to-the-minute metallurgical techniques may make for greater life and less maintenance in respect of certain components. Thus a machine is progressively developed even during service.

New applications.—An existing design of machine may be required to undertake duties for which it was never intended, yet the results achieved suggest that there is merit in the system employed. Cases of this sort arose when the prop-free front system was introduced in Britain and when coal-cutting machines were mounted on armoured conveyors and fitted with one or more jibs and chains. In many such cases, overheating of the motor resulted, and, in consequence, burning out of the stator windings, was experienced. Solution of these particular problems lay in the design and application of continuously rated water-cooled motors.

The improvement of one section of the machine does not necessarily solve all problems; it may prove necessary to stiffen up other basic units of which the machine is composed. This, however, will be a gradual process while greater operational experience is being gained. A decision may be made in due course as to whether a brand new design of machine is called for in order to achieve maximum results on the widest possible front.

Also under this class of development would be the case in which a new accessory is designed for use with a basic machine, either to extend its scope or perhaps make it more flexible in operation.

Extending the Range of a Product.—The enlargement, or possibly a reduction, in size of a design to widen an existing range of products is normally a relatively simple operation. The history of the existing design is already well known, and if practical experience suggests any improvement in design, either from the reliability or maintenance aspects, they can be built into the new model. In this category also may be placed equipment built on straightforward principles and on which much practical data have been accumulated over the years.

Completely New Designs.—In cases where new designs or techniques are involved the development period will inevitably be greatly extended. Many disappointments will be encountered and the cost, almost certainly, will be heavy. First of all, it is necessary to prove the principle involved, and this may best be done in the simplest possible way.

A "lash-up," for instance, fulfils a most useful purpose at this early stage. This should show whether the idea is sound, and as experience is gained any deficiencies will become more apparent. It may be possible to sort out some of the difficulties as the preliminary tests proceed, and as time goes on the basic requirements to be built into the first prototype machine will become manifest.

An appreciation of the operating conditions, even during the "lash-up" tests is essential, otherwise disappointment may follow when the prototype machine goes to work.

The prototype design must embrace the experience gained in the original trials, and if it has only been possible to improvise a solution during the preliminary tests, a practical answer must be built into the prototype design. Development of this design should only proceed as problems which appear are resolved satisfactorily from the design aspect. In the world of the theatre it is said "it will be all right on the night," but it is seldom that a problem ever resolves itself in the mine. Indeed, more usually, unexpected difficulties present themselves.

During the prototype tests, further unforeseen difficulties may appear entailing considerable modifications. There must be no hesitation at this

point; corrective action must be taken. Once the initial tests are over, it is necessary that a wider experience be gained and in order to assess the potential of the design more rapidly it may be advantageous to build additional units for trial simultaneously under different conditions.

DEVELOPMENT OF MINING MACHINERY

The period between the birth of an idea and its emergence as a production model is known as "lead time." This may be subdivided into four stages of development:—

(1) The first stage is the preparation of the project requirements and its basic specification, including basic data from the "lash-up" experiments where such have been carried out.

(2) The second stage is the design and production of the prototype and its testing.

(3) The preparation of production drawings, quantity production planning, jig and tooling forms the third stage.

(4) Finally, the manufacturing time before the first production models become available.

The duration of lead time varies greatly according to the magnitude of the project. For example, from information received from various members of the CUMM the lead time on certain products may well be as follow:—

Skip feeder	19 wk.
Hydraulic rotary percussive drill	1 yr. 2½ mths.
Hydraulic prop	1 yr. 9 mths.
Rock drill	2 yr. 9 mths.
Longwall coal cutter ..	3 yr. 4 mths.
Completely new cutting and loading machine	between 5 and 7 yr.

In practically all cases the time taken to design, build, and test the prototype is the greatest single factor in the whole development period.

Lead time will be influenced by many factors, apart from the inherent ease or difficulty of the project. The make-up of some manufacturers' works and organization is better fitted to handle development work than others, while the range of industries which the company serves may influence the position. For example, there are several cases on record where a machine or principle developed for one industry may be applied quite successfully in another field altogether.

Whether a project is large or small, speed is of vital importance. Once the decision to go ahead has been taken nothing should be allowed to stand in the way of progress. If an organization is large enough it can carry its own development section, and experimental plant can be progressed, with little help from the main factory organization. If this is not the case, a definite programme must be mapped out in order to speed up the passage of the work through the factory, particularly if the shops are heavily loaded with a formidable production programme.

A vital aspect of development work relates to the collection and recording of data. This is important, even in the simple case of a change of material or of detailed design of a component part. Methodical checks must be made of selected machines in which the new parts are fitted so that a speedy decision as to future policy may be made.

As the nature of the project becomes more complex a wider range of personnel will be needed to supervize performance and record all relevant facts.

The manufacturer's team for underground trials must be carefully selected and will include designers who have as much practical mining experience as possible; the operational staff must not only be "pit men" but must be capable of observing, analyzing, and recording everything relevant during the prototype trials. At this time development staff must be highly mobile and it must have the full backing of the factory organization behind it.

Fitters who have worked on building the prototype should be instantly available in the event of breakdown. In short, the whole development organization must be streamlined, efficient, and concerned only with the project for which it is vitally responsible.

Once the machine has passed through the prototype stage and is in active factory production, the work of development is not entirely ended. As more machines are put into service the range of operating conditions will be widened and, ultimately, weak links may appear in the design. The performance of early production models must therefore be subject to frequent checks until results show that these are no longer necessary. Until this position is reached, the rate of production should be most definitely controlled.

With a successful machine, past experience has shown that the demand is likely to build up rapidly, but the manufacturer must resist all efforts by potential users to persuade him to step up his output more rapidly than his past experience indicates is desirable. Restraint at this stage will certainly be to the advantage of the user and manufacturer alike.

Two parties are concerned with every development—the manufacturer and the potential user. In most cases the manufacturer, with the designers, works organization and field staff can do no more than build the machine. Reliance must be placed on the user for the practical experience gained and, indeed, constructive criticism is welcome. In Britain, the mining machinery manufacturers rely on the staff of the NCB to grant facilities to carry through experiments and thus to overcome the practical problems.

Meeting the Challenge at Home and Abroad

The mining machinery manufacturing industry has travelled far over the years, particularly during the past decade; it cannot afford to slacken off in its endeavours. Both during boom and difficult conditions, development for both home and export

markets must continue apace. Coal has got to fight to retain its place in world markets. Oil, natural gas, and, in the future, nuclear power, are its powerful competitors. These problems must be faced to a greater or lesser degree in many countries oversea.

In order to succeed, the issue is perfectly clear. Coal will have to be competitive in price. Explanations of the whys and wherefores—why this or that cannot be done—will not save the situation. Thus every possible step must be taken to ensure higher productivity, increased efficiency, and concentration of output, all of which add up to cheaper production costs.

How can mining machinery play its part in the battle for coal? Without doubt, improved and increased mechanization has a vital role to play. Machines of still higher productivity must be designed. Machines that will give automatically the greatest performance under the varying conditions of the coal face. Machines are required that will depend less and less on the skill of the operator as regards the tonnage they will produce and perform whatever duty is expected from them. This is the unmistakable trend in the characteristics of all machines and equipment used in all industries and it must apply to mining coal in all its aspects.

All these things will fall short of the target unless still greater power is available on the coal face. Important strides in cable design have made possible the use of motors of greatly increased power, while water-cooling has permitted the introduction of continuously-rated motors in mining machines. A very practical aspect to all this is that of cable handling under power, and considerable thought, coupled with the problems of safety, is currently being given to this problem. Perhaps the next most logical step, and a matter of major significance, might be the introduction of higher operating voltages on the coal face. Investigation of associated problems is already under way as the importance of such considerations is appreciated.

In order that a highly productive coal-winning machine may give optimum results, it must be able to travel continuously up and down the face without obstruction and delay. Waiting time must disappear. To help permit this, roof supports must be advanced just as rapidly as the machine moves forward so that the roof exposed by the machine may be supported with a minimum of delay. Self-advancing roof supports have already proved to be a practical proposition and development continues. Automation of supports, triggered off by the movement of the mining machine, is not just a stunt possibility; it is a practical one.

Highly productive coal-winning units call for face conveyors of increased capacity and power. The aim must be to keep the drive heads as compact as possible in order that a minimum area of roof shall be exposed at the gate end where roof problems are always the most severe. It has already been shown that the use of hydraulic drives can make possible the production of extremely compact conveyor drive heads and valuable practical data has already been accumulated and is being developed.

Virtually all power-loading systems today include the use of stable holes at each end of the face to permit the forward movement of the mining machine and the conveyor drive heads. Up to the present time these stable holes have been worked by orthodox means of coal cutting and hand filling or by the use of pulsed-infusion blasting followed by normal filling. Such methods must, of necessity, lower appreciably the overall efficiency of face work. Several attempts have been made to mechanize stable holes, and in at least one case a mining machine has been devised which formed its own stable hole. Further development along such lines should be both possible and practicable. In some countries physical conditions are such that headings may be driven out by efficient machines which will be wide enough to embrace the stable hole area also, but nature has not been so considerate in Britain.

Handling and Disposal of Ripping Dirt

A further problem which has not yet been completely solved is that of the handling and disposal of ripping dirt entirely by mechanical or other means. Slushers have been widely applied to this task with very considerable success. The duties involved, however, are becoming far more onerous with face advances up to 18 ft. or more per 24 hr. and so it is necessary that alternative methods should be developed still further. It has been said that the manufacturers have paid too little attention to the ripping problem. This criticism is not very well founded, as considerable thought has been given to this very tough problem and a number of methods have been tried out on an experimental basis. At the present time work is being carried out in cutting the ripping down by mechanical means, while debris has been pneumatically stowed with considerable success even in very thin seam conditions.

The dropping of the ripping does not present any particular problem, but if the debris is to be handled mechanically or pneumatically, the question of satisfactory fragmentation is a most vital one. This may well imply the use of additional shots, and this, coupled with a higher rate of advance of the ripping lip per 24 hr. does suggest that there is scope for drilling equipment of improved performance.

The pneumatic stowing of ripping dirt has many advantages and it may be necessary to incorporate a pre-breaker to handle lumps which cannot be fed directly into the stower. Considerable attention is now being given to this problem.

Disposal of pit dirt on the surface is a costly matter, apart from the difficulty, in many cases, of finding additional land for spoil-heaps. On the other hand, dirt packed on the coal face fulfils a useful purpose in improving roof control, and financial saving can be effected by stowing the ripping dirt in the packs rather than allowing considerable quantities to come out of the pit, as is all too frequently the case. Debris from back

rippings also needs to be considered; in many instances it may be possible to dispose of this material on the face. Here again, stowing offers considerable scope for investigation.

These comments have largely concerned longwall working, as it is the traditional method employed in this country. Shortwall methods are extensively employed in some other countries and the manufacturers have not neglected the development of equipment for room-and-pillar working.

DISCUSSION

MR. H. A. LONGDEN said the mining industry appreciated the help it had received from the machinery manufacturers during the past 13 difficult years when the demand was for coal and more coal. The AUTHOR indicated that the emphasis at the present time was on coal quality, and large coal was the first priority. While that was true at the moment, large coal would not be such a serious problem in the future. Fine coal would be the problem of the future. It was true that in the US they had machines that produced much fine coal, but their total costs of production were so low that the use of the fines was not important and it was often run to waste. With the costs of production they had, and would have in the future, the $-\frac{1}{2}$-m.m. product must be reduced to a minimum.

The AUTHOR mentioned the fact that good progress was being made in the rate of advance achieved per shift and per 24 hr. A substantial number of machines were being used that operated in one direction only. With such machines the conveyor could not be advanced until the machine had been flitted back to its starting position. Looking ahead, machines must be used which, loaded in both directions, give continuous operation.

The difficulties of maintaining an advance of 18 ft. in 24 hr. had been mentioned. It was fair to say that the limiting factor was usually the rate at which roads could be made. The development of a ripping machine to give a high rate of advance was now being undertaken.

Stowing was another most important subject, and there, too, there was room for a great deal of development, said MR. LONGDEN. They were doing well at present if solid stowing was operated for 5s./ton, but that was too high a figure. In talking of 5s./ton, no account was taken of benefits such as the elimination of back brushing, improved working conditions on the face, and the working of some otherwise unworkable seams.

MR. LONGDEN drew attention to the cost of equipping a mechanized unit today. They could afford to spend £100,000 when 6 ft. of coal was being worked and were getting 15 ft. advance in 24 hr.; but when 2 ft. 6 in. or less was worked the ratio between the capital cost of the equipment and the tonnage of coal became a very real problem. Another point to take into account was that in deciding on mechanized units they were counting on getting consistency of output; difficulty was experienced in achieving this in the past. Continuous working must be ensured and the machinery must be able to cope with day-to-day hindrances without trouble.

Development at Bretby

The National Coal Board was also developing at Bretby all types of appliances and machines which could be useful to the industry. Having developed them it was intended to offer them to the people who knew how to manufacture them. The mining machinery industry had been well served by a relatively small number of firms, who had learned the art of packing a lot of power into relatively small, but robust, machines. However, there was much to be developed at the present time and so many of these things were quite small, but very important. Mention had been made of a cable reel; a very small thing in itself, but, on the other hand, something that could help enormously in speeding up operations. MR. LONGDEN hoped that the Central Engineering Establishment would prove to be of value to the NCB and the mining machinery manufacturer. He was pleased they had secured working faces at an adjoining colliery where newly developed machines could be tried.

The NCB's Mining Research Establishment at Isleworth set out to do the more fundamental work. At present it was doing some very valuable work on the simple cutting of coal. It was, of course, associated with the board's present types of cutter pick. At Isleworth, they were also concentrating on the study of equipment which would enable the coal-getting machine to be steered from the roadhead. If a means of putting in equipment in a seam of 2 ft. or less could be found, and the machine could be steered effectively, big steps forward indeed, would have been made.

Feasibility Studies

MR. B. L. METCALF was sure that those who went to the mining machinery exhibition at Olympia were fascinated by what they saw displayed. What had impressed the speaker was the attention given to detail by the manufacturers. It was too much to expect a new machine every year. It was the gradual improvement of a machine that was so important.

The AUTHOR spoke of four stages in the development of machines, and MR. METCALF wondered if there was not another stage coming before these; one that he called making a feasibility study. There was room for more careful study before a manufacturer started a new development. Over the years machines had failed because there had not been sufficient thought beforehand. He hoped also that at the first stage of development the author had not forgotten maintenance, which should start on the drawing board. Mining machinery had to withstand a lot of abuse when used underground and it must be easy to give it proper maintenance.

Thanking Mr. Longden for his encouraging remarks the AUTHOR agreed that when considering thin-seam mechanization, the cost of equipment was very much greater in relation to the potential tonnage and thus the economic aspect was more formidable. In general, he would emphasize that while the equipment for a new face might be expensive, it would not cost a great deal more to increase the power of the motor and conveyor to yield a tremendous amount more coal per unit of time provided the power supply was adequate.

The Central Engineering Establishment at Bretby, had done some excellent work and it could do a very useful service in amplifying existing information. In regard to basic research, he, too, wondered if the cutter pick might not become out of date. He agreed on the need for more fundamental data. The lines of communication were already established and without question full use should be made of them.

Automatic steerage of machines was on the way and it had a great future. A certain measure of success was not far away and, by taking a relatively simple case, the principles involved should be practicable.

In thanking Mr. Metcalf for his encouraging comments about Olympia the AUTHOR said that speed of development was essential and a manufacturer must have a development programme planned out before

him. Undoubtedly, Mr. Metcalf was right when he mentioned the need to make a feasiblity study in connection with new machines. Indeed, such a procedure was vital and fell into the period needed to specify prototype machines.

The designer, having in mind the general complexity of modern equipment, must study maintenance angle carefully. This, as already suggested, must start on the drawing board. Unit construction within a machine was of great benefit in connection with maintenance and the splitting of the design into basic parts must not be too difficult from the potential aspect. At the same time, special tools required for any task should be kept to a minimum.

Mention had been made of the need for reliability in machinery. He was sure that the reliability of machines had taken an upward swing over the past few years. Referring to the work of the maintenance staff, the AUTHOR said it was most difficult for men at the mines to keep abreast of the times owing to the speed of development over the past few years. For example, the intensive use of hydraulics on a longwall coal face was quite a new subject and it would take a long time for maintenance men to become fully proficient in looking after the plant and diagnosing causes of any difficulty. Mining machinery manufacturers were prepared for men from the field to visit factories so that they could be shown what facilities they themselves employed to carry through maintenance in a proper way and to isolate faults.

Unit Construction

MR. J. W. PIRIE, referring to the overhaul of coal-face machinery, particularly power loaders, said an appreciable number of these machines were prototypes, with the result that it was impracticable to have spare machines available for the purpose of cyclic withdrawal and overhaul in Area central workshops. He therefore suggested that the machinery manufacturers should approach the design of coal-face machinery using the principle of sub-assembly units to the maximum degree and so allow of the holding of sub-assemblies which could be substituted for units in operation and the latter withdrawn for periodic overhaul.

Another problem associated with the introduction of new types and designs of plant and equipment was the training of mechanics and electricians who were required to maintain the equipment. He accepted the author's suggestion that more opportunity should be taken of the invitation to send craftsmen to the manufacturers' works. This was not always possible, however, and he suggested that CUMM members should give consideration to setting up of a few mobile units, suitably equipped, to provide instruction on the diagnosis of faults to electricians and mechanics on the job.

The AUTHOR agreed that the design of coal-face machinery should use the principle of sub-assembly units to facilitate maintenance. In some instances design of the more complex assemblies was already directed to this end so that tested and sealed replacement units could be substituted as complete sub-assemblies when occasion demanded.

On the question of mobile instruction units, this was quite a new thought and was certainly worth consideration. It was essential that there should be a nucleus of maintenance men capable of diagnosing faults and subsequently correcting them. This object could be achieved immediately by sending one or two experienced men to a manufacturer's works to gain knowledge and experience, and thereafter those men would provide a cell for spreading information among other members of the maintenance staff.

MR. W. DUNCAN was interested in the question of high power on coal faces and asked how near were they to getting high-tension machines on the face. There was also difficulty in handling heavy cables and he asked if cable-coiling machines were near perfection. There was one important feature they had to remember; that was dust-suppression measures on machines. They thought far better dust-suppression means should be fitted by the manufacturer.

Many problems must be solved in connection with the introduction of high-tension voltages on the coal face replied the AUTHOR, but he was sure that by close co-operation between all the parties concerned they would be solved. A figure of 1,100 V had been mentioned; by the use of such a power supply, machines could be developed which would give a great improvement in face output.

If the dust-suppression measures incorporated in machines were at present inadequate, then clearly something must be done about it. The author suggested that the CEE could possibly help. All manufacturers would co-operate in ensuring improved dust-suppression measures if it was necessary. Many collieries had their own thoughts with regard to suitable devices for dust suppression and, undoubtedly, requirements varied from colliery to colliery. In many instances collieries fitted their own equipment which they had developed themselves to suit their own particular conditions.

MR. GRAHAM felt that the author touched on a very important point bearing on the relationship between manufacturers and purchasers in this country, particularly when he said in connection with development work that it was important to resist any attempt to go prematurely into production. They were all too well aware of the troubles that could develop when installing new machines and it would be fair to say that in many cases the trouble had been brought on by a manufacturer going into production before he had all the answers.

The AUTHOR thanked Mr. Graham for his support and said that in recent years they had to get coal at any price, but in these more leisurely days they could take more time to develop a machine after it had passed the prototype stage.

Insufficient Preparation

MR. A. J. B. MUIRHEAD said new machines were often introduced into a colliery without sufficient preparation. It might be that there was a lack of power, lack of water for dust suppression, and various other reasons. He advised that after choosing a particular face for trials, the manufacturer should take every one with him in discussions at colliery level to ensure that everything was there to give the machine a good chance.

MR. MCLEOD commented that much had been said about the development of machines by manufacturers and the CEE at Bretby, but he was sorry not to have heard anyone mention the important part the colliery engineer played in the development of those machines. The manufacturers had done nothing to help in thin-seam mining. The average thickness in one district in Scotland was little more than 30 in., said Mr. McLeod, who asked if the author could indicate how they were to mechanize seams of that thickness and at the same time produce large coal.

In reply, the AUTHOR said that, with regard to the mining of thin seams, there were only two, or maybe three, companies concentrating on thin-seam mining.

Other manufacturers however, were actively studying the many problems involved. Considerable thought was being given to the type of equipment which would give higher efficiences than in the past.

MR. J. N. TAYLOR said it had become apparent from their experience during the past few years that a good and efficient signalling system on a power-loaded face was absolutely essential, and electrical engineers were not entirely convinced that the present arrangements were satisfactory. Because of the nature of its duty, coal-face signalling must be fairly complicated and at the same time robust. He suggested that manufacturers of armoured, flexible-face conveyors could do a lot to help by making provision for fixing standard types of signalling equipment on the conveyor structure.

The AUTHOR noted the point with regard to face signalling with interest. He suggested that this was again a matter in which the CEE could be of great assistance. He was sure that they could solve the problems concerned in the spirit of co-operation.

DR. PATERSON, who mentioned that in the past the main designs of power-loading machines in Britain had mostly been of positive types, *i.e.*, machines cutting out the coal by means of picks in chains or drums, asked how far were the manufacturers going in developing new machines and techniques, especially of the ploughing type.

Considerable thought had been given to ploughing and developments were under way, the AUTHOR said in reply. With improved voltages, the output of machines could soar, and here he was drawing the line between power loading and ploughing. Advances in metallurgy were continually recorded and improved metals could certainly open up a wider field.

National Association of Colliery Managers

Lancashire Branch Annual Dinner

MEMBERS of the Lancashire Branch of the National Association of Colliery Managers followed their annual meeting last Friday with the annual dinner at the Pack Horse Hotel, Bolton. In proposing a toast to the association, Mr. N. F. Brand, president of the North-West branch of the Association of Mining Electrical and Mechanical Engineers, pointed out that his association was celebrating its jubilee year. He referred to the close ties which bound together the two associations.

Mr. H. E. Tyson, secretary of the Lancashire Branch of the NACM and its national president, replied. He said: "In these difficult times we have to look forward very carefully to the future of our association when we appreciate it now has some 3,000 members, only about 800 of whom can be managers of mines." He hoped that members of the association would appreciate that a manager of a mine was still and always would be the key man in the industry.

He referred to the Lancashire coalfield as a shrinking one. "I believe that the more mining men, men trained to be colliery managers, there are in every department of the National Coal Board, the better will this industry of ours be run," he said. He appealed for the younger ones to look at all the jobs going in the industry and "have a go at them." He emphasized: "I do feel that the qualified colliery manager should get his feet firmly set into every department."

Mr. G. W. Sanders, newly elected president of the branch, proposed a toast to the National Coal Board. His message was: "I suggest to you that people are always more important than things. Or, as one person put it, men matter more than matter." The most difficult task of management at any level was to inspire those below with a common purpose. To achieve success it was worth making a tremendous effort. Mr. Sanders said he was confident that if the staff was fittingly handled, then they would successfully fulfil any task. "Improvements in the future can only come from improvements in methods," he said. There was still a very wide field for further improvement. The new president said that "muscle is about the most costliest power on the earth, and the more we can get rid of it the better." New ideas should be encouraged. They should be courageous—and not "wave the red flag in front of new ideas."

In reply, Mr. H. W. Barker, deputy chairman of the North-Western Divisional Coal Board, spoke of the anxious times through which the industry was passing. But he was confident that many of its problems would sort themselves out. "There is a future, and you all know it, in the coal industry in Lancashire," he added.

Mr. A. D. Nutter, past president of the Lancashire Branch, proposed the toast of the guests, who included Mr. R. Clough, HM Divisional Inspector of Mines; Mr. T. Knowles, Area general manager, No. 1 Area, North-Western Divisional Coal Board, Mr. H. Langford Holt, a director of Dowty Mining Equipment, Limited, and Mr. J. C. Fletcher, president of the Manchester Geological and Mining Society. Mr. Langford Holt replied.

Presentation of a 1959-minted golden sovereign to Mr. Tyson was made by Mr. Fletcher on behalf of past presidents of the Lancashire Branch as a memento of his year as national president.

At the annual meeting, Mr. Sanders was elected the new branch president, with Mr. W. J. W. Bourne as the president elect. Mr. H. E. Tyson and Mr. J. Bradshaw were re-elected hon. secretary and hon. treasurer, respectively.

Members elected on to the council were:—Representative of the North-Western Division: Mr. W. J. W. Bourne; Manchester: Mr. R. Barker, Mr. F. Darley, and Mr. W. Middleton; Wigan: Mr. J. McGann, Mr. S. Hay, and Mr. W. Shawcross; St. Helens: Mr. J. Abbott, Mr. H. Foster, and Mr. E. Petts; Burnley: Mr. W. Dewhurst, Mr. W. Oldroyd and Mr. A. T. Walton.

New Equipment and Products

Electric-powered Winches

RANGE of electric-powered winches introduced by Felco Hoists, Limited, London, S.W.7 (Fig. 1), are in capacities from 2 to 12 tons. Of all-steel construction, they are of entirely new design. Having no bed-plate or platform, all parts of the winch mechanism are fully enclosed, the absence of exposed parts making the equipment weatherproof.

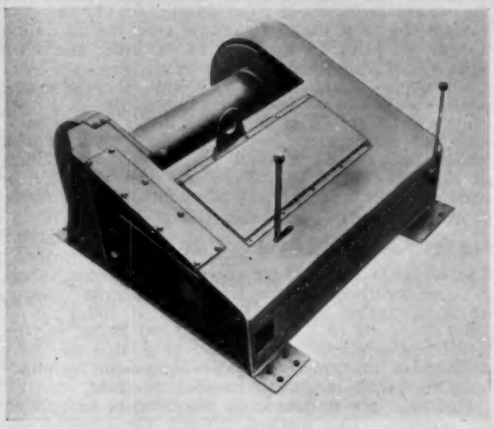


FIG. 1.—THE FELCO ELECTRIC-POWERED WINCH.

All the gears run in oil baths and are mounted on ball bearings. Among the interesting features is an electro-hydraulic main brake, in addition to an auxiliary foot brake for controlling the load when operating the winch in the drum idling position.

New Rope-belt Conveyor

PRIMARY component of a rope conveyor system introduced by Joy-Sullivan, Limited, Greenock, is the Limberoller idler (Fig. 2). The new Limberope system enables the features of Limberoller operation to be extended to a much wider range of applications. The installation comprises flexible Limberollers mounted in rigid, tubular steel cradles, which in turn are suspended at each end between parallel wire ropes. These "stringers" are held at the required height by chains attached to stands, which carry integral return idlers.

Of specific interest for the temporary conveyor operator is the speed with which an entire system can be set up, dismantled, and relocated to meet various point-to-point conveyor requirements. This is facilitated by quick-release handle-bolts on cradle bracket and support stands, and further enhanced by the low tension required on the wire stringers between anchor points. The manufacturers claim that a complete system can be installed at a price which compares very favourably with conventional rigid conveyors. The intrinsic design of the system permits insertion of Limberollers and support stands at wide intervals—rollers from 4 to 9 ft., stands from 12 to 40 ft.—depending on the load carried—and caters for densities up to the 150 cub. ft./lb. class. Thus, on a long run substantial economies may be effected on capital expenditure. The Limberope system can be applied to any belt width from 16 in. to 36 in., wire rope diameter varying from $\frac{1}{2}$ in. to $\frac{3}{4}$ in. to cope with the extremes.

The conveyor, it is claimed, is particularly suited to outdoor applications, where the conveyor follows ground contours and spans gullies, etc., without the need for elaborate support structures. On underground mining installations the conveyor is quickly extendible at a rate of approximately 20 ft. per man-hour, to keep pace with rapidly advancing faces.

Improved load-handling characteristics inherent with the Limberoller idler conveyor are stated to remain unimpaired in the system. The flexible idler in its swivel mounting conforms to the load, and provides a "cushioned" ride which absorbs shock and surge loadings. Belt life is extended because there can be no "pinching" and there are no projections to rip the belt. The troughing catenary exerts a self-centring action on the material, largely preventing spillage and underbelt material build-up. Attention is drawn by the manufacturers to the "no-maintenance" feature. Only two bearings carry the idler, instead of the usual six, and are of the self-lubricating "sealed-for-life" type, situated well above the dirt zone.

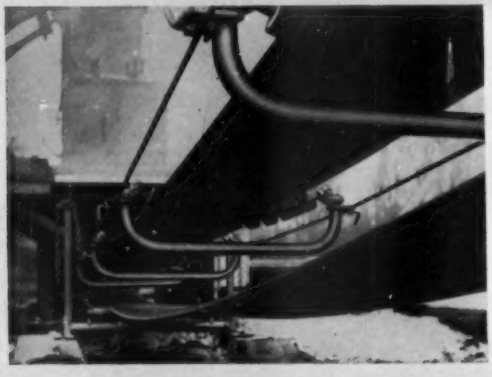


FIG. 2.—THE JOY LIMBEROPE ROPE-BELT CONVEYOR.

Pneumatic Drop-hammer Innovations

OF interest to forging and dropforging engineers are new developments introduced by B. & S. Massey, Limited, Openshaw, Manchester. One of them is a footguard for power hammers. The firm states that in attempts to prevent accidents due to the inadvertent operation of the footlever of a pneumatic hammer or to a work-piece falling from the lower pallet, various guards have been devised without any being completely successful, as they either impeded access to the pallet or prevented entire freedom of the foot when operating the footlever.

The guard illustrated in Fig. 3 overcomes these difficulties. It has been in practical use in the smithy of the firm for some time and has proved quite satisfactory. It is now being strongly recommended for all

the smaller pneumatic power hammers having either "clear space" or "slides."

A second innovation is the nylon lifting belt for friction drop-hammers. Hitherto the use of woven hair lifting belts was general practice in the dropforging industry. For a number of years now, B. & S. Massey has been subjecting nylon lifting belts to severe drop-

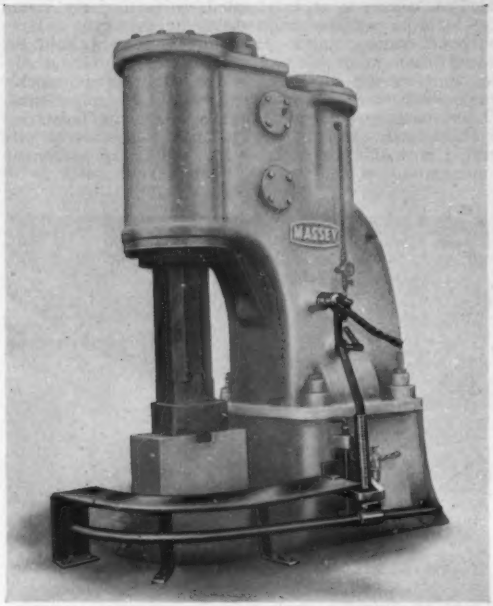


FIG. 3.—FOOTLEVER GUARD FOR MASSEY PNEUMATIC HAMMERS.

hammer tests under actual forge conditions. The earlier type of nylon belt proved to have too great a stretch, but the manufacturers have now devised a belt that is superior in every way to the woven hair belt originally used. Some users have reported that this nylon belting has lasted for more than five years.

A third development relates to friction band linings and hold-up band linings for drop-hammers. In the early post-war years, the manufacturers of friction brake linings began to use new materials which made their product less suitable for friction and hold-up bands, particularly those of the self-contained and Marathon hammers, where the drum diameter is less. Following a number of band failures, an investigation was undertaken and the firm is now able to offer linings which have passed a most stringent test under working conditions.

X-Ray Unit

FOR examination of mild steel of up to 3 in. thickness, a new lightweight, portable industrial X-ray unit of 300 kV capacity, known as the "Baltospot G300D," has been introduced by Pantak, Limited, Windsor (Berks). Both insulation and cooling of the X-ray tube are effected by a chemically and physiologically inert and non-inflammable gas. The use of this medium results in a lightweight tank head construction and achieves a high power/weight ratio, the weight being 142 lb. The unit can be supplied with either a conventional 40-deg. solid angle beam insert tube with a fine focus, size 3.0 mm., or a 360-deg. circumferential radiation insert tube. Cooling of the anode is achieved in either case by forced circulation of the insulating gas by means of an internal blower.

The cylindrical tank head is pressurized and fitted with a pressure gauge so that the insulating gas may be checked at will. A cradle is supplied in which are incorporated anti-shock mountings, while the tube is protected against excessive temperature by a thermo switch mounted in the tank head. A further device in the control unit simulates the thermal capacity of the anode and gives the operator a visual indication of any overheating. A particular advantage is that a series of exposures can be planned without risk of overheating the tube. Maximum dimensions of the unit are 40 in. long by 9 in. dia. When fitted with the protective cradle the weight is increased from 142 lb. to 171 lb. The control unit is of the carrying-case type, the maximum dimensions being 18 in. long, 14 in. wide, and 8 in. deep, and weighs 60 lb.

The control operates from a 220-volt, 50-cycle, single-phase supply and accommodates fluctuations of 10 per cent. either way. It is fitted with direct reading kilovolt and milliameters in addition to a synchronous timer which can be arranged for automatic repetition of exposures. The kilovoltage and tube current controls are of the stepless type giving continuously variable control.

Siskol's New Mobile Pump Unit

POWERED by a 25-h.p. flameproof electric motor and incorporating the Tangye "Hydraflo" pump, which is capable of delivering water at 500 g.p.h. at 3,000 lb./sq. in. or 1,000 g.p.h. at 1,500 lb./sq. in., the Siskol mobile pump unit type 5/E (Fig. 4) is the latest addition to the range of water equipment manufactured by Siskol Machines, Limited, Sheffield.

Hydraulic power is used on the pump to reciprocate the plunger. This method replaces the conventional system of gears, crankshafts, and connecting rods, and results in an appreciable saving in maintenance and spares costs. The pump is suitably protected by a sheet-metal cover and is mounted on four roller-bearing wheels with adequate braking provision.

The unit is likely to prove most effective for conventional water infusion and for long-hole infusion.

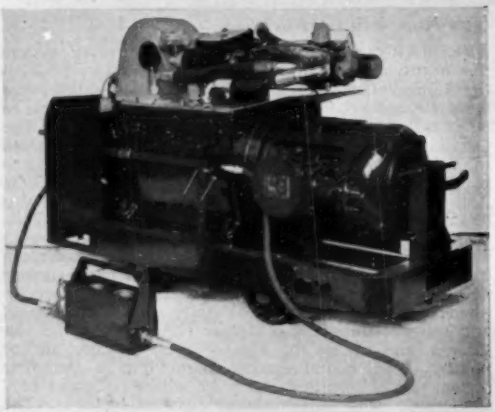


FIG. 4.—THE SISKOL MOBILE PUMP UNIT, TYPE 5/3, SHOWN WITH TOP COVER REMOVED TO REVEAL THE PUMP.

IRON AND STEEL INSTITUTE

Annual General Meeting in London

MR. W. BARR, the retiring president, was in the chair at the opening of the 91st annual general meeting of the Iron and Steel Institute in London on Tuesday of last week, when the formal business, including the announcement of awards and prizes, was conducted. In his presidential address, the new president, Mr. W. F. Cartwright, spoke on production control in large integrated steelworks. He described the evolution of present-day practices and indicated the promising trend towards the use of data processing systems for production control. Mr. Cartwright said there was no longer any question of whether such systems would work and it was now merely a matter of how soon and in what way they could best be used.

Announcements of future meetings included the following:—Autumn general meeting of the Iron and Steel Institute, November 29 and 30, 1960, and conference on "Steels in Reactor Pressure Circuits," November 30 to December 2, 1960, in London; meeting of the Iron and Steel Engineers' Group, October 24 to 27, 1960, at Scunthorpe, annual general meeting of the Iron and Steel Institute, May 3 and 4, 1961; special meeting of the Iron and Steel Institute in the USA, autumn, 1961; autumn general meeting of the Iron and Steel Institute, November 29 and 30, 1961, in London.

The afternoon of Tuesday and the whole of Wednesday and Thursday of last week's meeting were devoted to a symposium on wide-strip production and there was an additional session on steelmaking in electric-arc furnaces on the Thursday afternoon.

DETAILS OF PAPERS

The following papers, under the various subject headings, were presented and discussed:—

FUTURE REQUIREMENTS OF THE VEHICLE AND TINPLATE INDUSTRIES:—"The Future Requirements of the Vehicle Industry," by W. E. Lambourn; "The Future Requirements of the Tinplate Industry," by C. E. S. Sutton.

STEELMAKING FOR WIDE STRIP:—"Oxygen Steelmaking for Flat-rolled Products," by R. W. Evans; "Open-hearth Steelmaking Practice for Flat-rolled Products," by S. J. Dougherty and R. Duffett; "Production of Steel with Intensive Use of Oxygen in the Open-hearth Melting Shop at Cornigliano," by M. Foresi and G. Massobrio," "Quality Control of Wide Strip Mill Products," by J. H. van der Veen.

HOT ROLLING OF WIDE STRIP:—"Design and Layout of a Modern Hot Strip Mill," by J. J. Beese, M. F. Dowding, C. Sturdy, and A. A. Thomas; "Operation of the Wide Strip Rolling Mills at Fairless Works," by K. L. Johanssen.

COLD ROLLING AND HEAT-TREATMENT OF WIDE STRIP:—"Metallurgical Principles and Practice in the Manufacture of Cold-reduced Tinplate," by W. J. S. Roberts; "The Rolling of Very Thin Tinplate," by M. D. Stone; "Some Engineering and Operating Problems in the Conversion of a Tandem Cold-reduction Mill to Higher Speed," by W. H. Corlett, S. A. Lewitt, and S. Gray; "Short-time Annealing of Capped, Rimmed, and Semi-killed Wide Strip," by P. N. Richards; "Annealing of Cold-reduced Sheet and Coil," by H. H. Ascough.

COATINGS:—"The Application of Tin Coatings in the Manufacture of Tinplate," by G. E. Jones; "Galvanizing: A Review of the Hot-dip Processes with Some Reference to Electrogalvanizing," by H. Edwards, E. D. Harry, and E. Jenkins; "Plastic-coated Steel," by S. S. Carlisle and W. Bullough.

STEELMAKING IN ELECTRIC-ARC FURNACES:—"The New Electric Melting Shop of Steel, Peech & Tozer," by A. Jackson and R. S. Howes.

STEELMAKING FOR STRIP MILLS
Highlights of Some of the Papers

All the papers presented at the symposium on wide-strip production will be published, together with the discussions, in due course in the special report series of the Iron and Steel Institute. Some of the salient features of the papers are reported below.

"Oxygen Steelmaking for Flat-rolled Products"

In an accomplished review of oxygen steelmaking for flat-rolled products Mr. R. W. Evans showed how the development of the strip-rolling process in the USA was based on open-hearth steel, which, using low-phosphorus iron, was able to supply a very satisfactory product. In Europe, however, with its considerable basic-Bessemer production and high-phosphorus ores, changes had been necessary. Phosphorus and nitrogen contents of the steel had been reduced, but the introduction of tonnage oxygen had facilitated this.

He described briefly the early efforts made by continental steelmakers before the advent of tonnage oxygen to make low nitrogen steels in the converter. Methods using iron-ore additions in the final stages of the converter process (the HPN process) and special temperature-control procedures to avoid unnecessarily high temperatures

at tapping had given some improvement, but these methods were slow and imprecise. When tonnage oxygen became more readily available experiments with the air blast enriched in oxygen had quickly shown the following useful results:— (*a*) Heats could be blown faster, depending on the degree of enrichment; (*b*) more rapid oxidation produced higher temperatures, which required scrap or ore as a coolant; thus less pig-iron was needed; (*c*) it reduced the partial pressure of nitrogen in the blast, enabling lower-nitrogen steels to be made.

The author then considered oxygen steelmaking processes under their three main groups.

Blowing with oxygen-enriched air—Thirty-five per cent. oxygen was about the maximum oxygen content in the mixture that could be used. Above this, wear on the bottom was excessive, even though sufficient scrap was added to cool the charge. With careful temperature control it was possible to produce nitrogen contents down to 0.007 per cent., which allowed the steel to be used for many tinplate specifications, for drumstocks, and for some hot-rolled qualities. Carbon and phosphorus contents were similar to those produced by other bottom-blown techniques.

Blowing with steam-oxygen mixture.—This process provided a method of bottom-blowing with complete exclusion of nitrogen if desired. This meant that a heat could be blown from beginning to end with steam-oxygen mixture only, no air being used at all. Thus average nitrogen contents of 0.001 per cent. were easily achieved, together with phosphorus contents of 0.020-0.030 per cent., depending on the requirement.

In most plants in which this process was used, conventional converters and blowing methods were also used, so that a blower was available to provide air. This was often an advantage, as the use of steam-oxygen alone tended to result in more rapid wear of the bottom. Thus it had been found advantageous, for instance, to use air only for the first one or two heats on a new bottom, and, in some cases, air was used for the final dephosphorizing blow, with the object of eliminating steam and possibly hydrogen from the steel, but with the disadvantage of finishing with a slightly higher nitrogen.

Steam-oxygen process at Abbey Works—The basic Bessemer plant at the Steel Company of Wales, consisting of three 50-ton bottom-blown converters, was unique in that no air blower was provided, so that only steam-oxygen mixture could be used. Although, when the plant was started in July, 1959, severe problems were encountered in bottom life and it took a little time to establish the best bottom-making techniques, these problems were now largely solved and the plant was consistently making the best-quality deep-drawing steel. Table 1 gave results on 10 consecutive casts recently made.

The method of operation was to charge lime with the vessel up, and then bring it down to charge scrap and hot metal. After about 10 min. blowing the phosphorus would be down to about 0.05-0.08 per cent. The vessel was then brought down for sampling, temperature testing, and slagging, this primary slag containing about 18-20 per cent. P_2O_5. Analysis of the sample was done by Quantovac, and the result was signalled back to the illuminated analysis board on the converter platform within 2½ min. of the sample being despatched. After a lime or limestone addition the vessel was put up for the afterblow, the length depending on the first analysis. A normal afterblow would be about ½-¾ min. after which the phosphorus would be below 0.03 per cent. The vessel was then brought down, temperature taken, sampled, and a lime dam built. The steel was then poured into the steel ladle on a power-driven carriage which took it into the teeming bay, where the casting bay crane picked it up for teeming. Steel temperature at tap was approximately 1,600 deg. C.

Typical quantities of raw materials for one heat (62 tons of ingots) were:—

Hot metal	70 tons
Scrap	4 tons
Lime	9½ tons blowing 1 ton lime dam
Fe-Mn	8½ cwt.

Blowing with CO_2-O_2 mixture—In this bottom-blowing process, the object was also to exclude nitrogen completely, the inert diluent being carbon dioxide instead of steam. This process was used at only one works, but in spite of its ability to make excellent steel, at least equal to that of steam-oxygen blowing, it had not found favour, probably owing to the high cost of production of carbon dioxide and in spite of the higher quantities of

TABLE 1.—*Analyses of Basic-Bessemer Heats at the Steel Company of Wales, Limited.*

Cast No.	BA 735	BA 736	BA 737	BA 738	BA 739	BA 740	BA 741	BA 742	BA 743	BA 744
C, per cent.	0.055	0.050	0.055	0.060	0.055	0.050	0.050	0.050	0.045	0.040
S, per cent.	0.020	0.020	0.020	0.022	0.021	0.020	0.020	0.022	0.022	0.022
P, per cent.	0.027	0.028	0.021	0.025	0.022	0.023	0.025	0.028	0.020	0.019
Mn, per cent.	0.25	0.31	0.32	0.28	0.26	0.26	0.26	0.24	0.25	0.28
Cu, per cent.	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
Ni, per cent.	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.040
N_2, per cent.	0.0008	0.0010	0.0008	0.0010	0.0016	0.0010	0.0014	0.0008	0.0012	0.0010
Ingot tons	61.25	62.00	62.00	62.00	62.00	62.00	61.00	59.50	62.5	60.00
Total blowing lime, min.	15 : 5	12 : 45	14 : 0	13 : 25	13 : 7	11.50	12 : 27	12.51	11 : 42	12 : 10
Total lime used, lb./ton	349	345	345	340	345	345	345	367	349	360
Scrap used, per cent. of charge	5.41	5.43	5.41	5.39	4.11	4.11	4.13	4.1	4.11	4.04
P_2O_5 (1st slag), per cent.	12.82	17.22	22.80	20.62	19.70	21.26	18.23	17.96	17.77	17.40

Average hot-metal analysis: Si, 0.38 per cent.; S, 0.022 per cent.; P, 1.72 per cent.; Mn, 0.73 per cent.

scrap that can be used compared with steam-oxygen blowing.

Top-blowing Processes

The most famous top-blowing process, the LD, was initiated in Austria at Donawitz and now used throughout the world; it had taken its place alongside the open-hearth, Bessemer, and electric-arc furnace as one of the classical steelmaking processes.

Details of the operation of a two-furnace plant at the Aliquippa plant of Jones & Laughlin, which was associated with a hot-strip mill, had recently given an example of what the top-blowing process using low-phosphorus iron could do. During the 30 operating days of April, 1959, the plant consisting of two furnaces, produced 67,600 gross tons of ingots. The furnaces, originally designed as 58-ton capacity, averaged 74½ gross tons per heat.

The data concerning this campaign were:—

Average scrap consumed ...	31·44 per cent.
Total no. of heats	907
Average time per heat (tap-to-tap)	46·21 min.
Average ton/hour (tap-to-tap) ...	96·5
Average blowing time (oxygen on)	20·81 min.
Oxygen consumed per ton ...	1,810 cub. ft.
Yield of ingots per ton of charge	86·93 per cent.
Average heats per lining	193·59 (max. 271)
Average brick usage per ton ...	21·3 lb.

The average quality of iron used was:— Si, 0.9-1.7 per cent.; Mn, 0.4-0.5 per cent; S, 0.05 per cent. max.; P, 0.125 per cent. The composition of the steel make averaged:— P, 0.010 per cent.; S, 0.017 per cent.; N_2, 0.003 per cent.

Jones & Laughlin was now planning the installation of a 200-ton LD furnace.

Top-blowing process using high-phosphorus iron—Although the Austrian process had been adapted to the use of higher-phosphorus irons than 0.3 per cent. the most successful treatment of irons containing 1.8-2.0 per cent. P had been achieved by means of blowing powdered lime with the top-blown oxygen stream. For this purpose it was necessary to have a dispenser that could feed powdered lime continuously at regulated rates into the oxygen stream and thus into the bath. The impact of powdered lime at the point of maximum temperature development in the bath enabled a fluid slag to be quickly formed which was capable of dephosphorizing, thus enabling a process using 100 per cent. oxygen to eliminate phosphorus before carbon without having recourse to rotary vessels.

This method of operation had been carried out successfully at both Denain in France and Dudelange in Luxembourg. The degree of control that could be exercized on the state of oxidation and the basicity of the slag enabled the process to make steels very low in phosphorus and sulphur from normal basic-Bessemer iron, without having a rotary converter. Compared with open-hearth steel, the chemical analysis was at least equal for strip-mill products.

Rotary Processes

Initially there was no pneumatic process which excluded air from the blast and which could be applied to basic Bessemer irons. The two rotary steelmaking processes, Kaldo and Rotor, the former developed at Domnarvet in Sweden and the latter at Oberhausen, Germany, were initially intended for pre-refinement of iron and developed into steelmaking processes later. In both cases rotation of the vessel prevents slag attack on the lining at a fixed level, and in both cases the oxygen-slag-metal reactions were accelerated by the movement of the vessel. Theoretically, it should be possible to use considerably more scrap or ore in the rotary processes as a result of burning carbon monoxide in the vessels.

Capital Costs and Economics of Processes

Capital cost.—It would appear that a simple non-rotary vessel provided the cheapest installation (*i.e.*, top-blown LD or oxygen + lime process). In the latter case, provision for crushing lime and dispensing it into the oxygen stream had to be installed, which was relatively inexpensive. All the processes that specifically exclude nitrogen consume approximately the same quantity of oxygen per ton of product, so the oxygen plant cost would be about the same for all; high-purity oxygen was necessary. In addition, either steam or carbon dioxide must be provided for the bottom-blown processes.

Fume-cleaning equipment was necessary for all top-blown converters, which involved also cooling the gases. This was not necessary for bottom-blowing with steam and oxygen.

In general, bottom-blown installations would require more vessels, owing to the time occupied in bottom changing.

Flexibility of hot-metal quality.—Almost any quality could be used in Kaldo, Rotor, and top-blown oxygen + lime. Below 0.35 per cent. P was necessary for LD, and above, say, 1.6 per cent. P for the bottom-blown processes.

Quantity of scrap or iron ore used.—Top-blown processes, Kaldo and Rotor, could use up to about 30 per cent. or more of scrap. Bottom-blown processes were limited to about 7 per cent.

Yield of ingots.—It would appear that the top-blown processes were about 3 per cent. better than bottom-blown.

Consumption of refractories.—Generally the top-blown processes would show an advantage.

Slag credits.—All the processes could use up to 2 per cent. P hot metal, except LD, and could therefore carry substantial slag credits.

"Open-hearth Steelmaking Practice for Flat-rolled Products"

S. J. Dougherty and Ralph Duffett, of the National Steel Corporation, gave very full details of steel-

TABLE 2.—*Open-hearth Charge and Production Data.**

	Great Lakes.	Weirton.
Daily ingot production	9,625	8,268
Charge materials:		
Hot metal, per cent.	57.43	69.83†
Cold iron, per cent.	4.45	2.10
Total iron, per cent.	61.88	71.93
Ore charge per ton of ingots, lb.	207.44	180.00‡
Purchased scrap, per cent.	10.16	12.50
Home scrap, per cent.	21.98	14.30
Limestone/ton, lb.	91.47	110.00
Burnt lime/ton, lb.	16.37	20.00
Feed ore/ton, lb.	28.32	21.16
Combustion oxygen, cub. ft./ton	180	152
Oxygen for carbon reduction, (roof lance only), cub. ft./ton	700	673
Fuel, B.Th.U./ton	Oil + natural gas 3,480,000	Oil 3,014,000 (71.4 per cent.) Pitch 3,704,000 (28.6 per cent.)
Charge-tap, ton/h.	29.53	31.03
Tap-tap, ton/h.	26.70	28.04
Scrap charging time, h.	2 : 38	3 : 37
Charge-tap time, h.	15 : 07	13 : 08
Tap-tap time, h.	16 : 43	14 : 32
No. of furnaces	17	14
Size groupings	*No. 1 Shop* 250 tons 1 450 tons 7 550 tons 4 *No. 2 Shop* 250 tons 1 450 tons 4	275 tons 5 425 tons 5 500 tons 1 550 tons 2 600 tons 1

* Average for first six months of 1959.
† Hot metal 11.98 per cent., blown metal 57.85 per cent.
‡ Small tonnage ore charge heats only.

making at the Great Lakes Steel and the Weirton Steel open-hearth shops in Michigan and West Virginia, respectively. The large range of products produced by this company is shown in Table 2.

At Weirton.—Although some scrap-hot-metal and ore charge heats were made at Weirton, the blown metal charge was considered the major process. About 80 per cent. of the hot metal from four blast furnaces was blown in three 40-ton acid converters to approximately 2.00 per cent. C. at about 1,455 deg. C. This blown metal was charged into the larger furnaces of 425 tons and over at about 90 deg. C. above the temperature of regular blast-furnace iron. Roof lances were used on eight of the 14 furnaces in the shop. The oxygen was derived from a 500-ton low-purity plant. No oxygen enrichment was used in the converter. The large size of the furnaces necessitated the use of two ladles with bifurcated spout. The principal charge consists of 60-75 per cent. blown metal of 1.75-2.00 per cent. C, 25-40 per cent. scrap, and 5 per cent. raw limestone. The limestone is charged first, followed by the scrap.

At Great Lakes.—The Great Lakes open-hearth furnaces were operated on a conventional hot-metal-ore-scrap charge. Hot metal made up 60 per cent. of the total metallic charge when possible, as this practice had been proved to produce the maximum tonnage with the present furnaces and auxiliary equipment.

The charge and production data for the Great Lakes and the Weirton shops were as shown in Table 2.

The large range of products made (see Table 3) called for a varied ingot practice and some of the less conventional deoxidation controls were employed. Thus at Weirton silicon carbide was used for ladle deoxidation control on 0.06-0.12 per cent. C mechanically capped steel as follows for 275-ton heats:—

Slag FeO, per cent.	Weight of silicon carbide, lb.
<15·00	50
15·01—20·00	70
20·01—25·00	85
25·01 and above	100

Experience had shown that the silicon carbide was not as effective as aluminium shot. This was most important with the rephosphorized grades of 0.070-0.080 per cent. and 0.125-0.140 per cent. P for beer-can end stock; 75 lb. of aluminium shot was therefore used for FeO under 20.00 per cent. and 100 lb. for over 20.00 per cent. FeO for these grades.

Sodium fluoride or some other rimming agent with or without aluminium was used to slow down capping "hit" times. The best results were obtained by not omitting aluminium completely but by adding the rimming agent with aluminium on the fast capping "hits."

In recent years the practice had moved over to

TABLE 3.—*Range of Analysis of Various Grades of Steel of the National Steel Corporation.*

C, per cent.	Mn, per cent.	S, per cent.	P, per cent.	Cu, per cent.	Sn, per cent.	Si, per cent.	Cr, per cent.	Ni, per cent.	Mo, per cent.
Deep-drawing Rimmed Steel									
0.06 max.	0.25—0.35	0.026 max.	0.010 max.	0.12 max.	0.012 max.	—		0.11 max.	
Deep-drawing Al-killed Steel									
0.06 max.	0.28—0.35	0.030 max.	0.010 max.	0.12 max.	0.012 max.	—			
Mechanically Capped for Moderate Drawing and Forming									
0.08 max.	0.25—0.35	0.035 max.	0.012 max.	0.15 max.	0.020 max.	—			
Mechanically Capped for Physical Quality in Carbon Required									
0.13—0.20	0.35—0.45	0.035 max.	0.015 max.	0.15 max.	0.030 max.	—			
Mechanically Capped for Tinplate to Meet Required Tempers									
0.08 max.	0.30—0.40	—	—	—	—	—			
0.08—0.10	0.35—0.45	—	—	—	—	—			
0.10—0.12	0.40—0.50	—	—	—	—	—			
0.10—0.12	0.40—0.50	Rephosphorized 0.125/140 beer-can end stock							
Semi-killed Special Physical Quality Sheets and Plates in Carbon and Manganese as Required									
0.12—0.35	0.35—0.85	0.035 max.	0.020 max.	—	—	0.06 (aim)			

Fully Killed Low-alloy High-strength Steels
NAX series for sheets and coils to meet 50,000 lb./sq. in. minimum yield point.
N-A-XTRA series for heat-treated sheets and plates to meet 70,000—120,000 lb./sq. in. minimum yield point.
Semi-killed Niobium-treated Steels
GLX-W series for sheets, coils, and bars to produce 45,000—60,000 lb./sq. in. minimum yield point.

TABLE 4.—*Combustion Programme.*

Period.	Reversal temperature.	Fuel oil, kcal./h.	Pitch creosote, kcal./h.	Coke-oven gas, kcal./h.	Methane, kcal./h.	Steam, kg./h.	Air, kcal./h.	Oxygen, cub. m./h.
Fettling:								
Walls	—	6	—	—	10	650	Blower	—
Hearth	—	—	—	—	10	—	closed	—
Start charge:								
to hot metal	200	12	—	10	12	650	38	2,000
1st hot metal 100 to 2nd hot metal	100	—	14	—	10	650	40	2,000
2nd hot metal to bath melted	100–50	—	14	—	10	650	40	2,000
Bath melted to last ore addition	50–100	—	14	—	10	650	40	—
Last ore addition to tap	100	—	14	—	Balance	650	Fuel + 10 kcal./h.	—

NOTES.—The burners must be cleaned after each heat and kept raised during charging and gradually lowered during melting. The flame must strike the bath on the axis of the first door.
Pressure in the furnace must be kept at 3.0 mm. w.g. for the entire heat.
During build-up of the banks, the air should be reduced to 30 kcal./h., with the same fuel input.
During hot-metal charging, the air and fuel input should be kept constant, with regular reversals.
To change doors and frames, reduce air input to 28 kcal./h., with the same fuel input.

the single-cut slab and this had meant that at Weirton the practice of top-cut diversion had had to be discontinued. Using aluminium bar, closer ingot-delivery scheduling, and inversion of the ingot at the soaking pits, it had proved possible to produce aluminium-killed cold-rolled sheets with better surface and freedom from pipe on single-cut slabs without the use of hot tops. Slab yield was 3-4 per cent. over that of hot-top steel.

"Production of Steel with Intensive Use of Oxygen in the Open-hearth Melting Shop at Cornigliano"

G. Massobrio's account of activities at Cornigliano showed clearly that the open-hearth furnace can go far towards meeting the production rates of the new converter processes.

At Cornigliano the intensive use of oxygen had been thoroughly demonstrated, being used as follows:—(1) *In the period from start charging to hot metal addition, high rate of oxygen flowing from burner with simultaneous maximum fuel input.* (2) *During the period from completion of hot-metal addition to bath melted.* Two ways of doing this were tried:—(*a*) A high rate of oxygen input from the burner to speed up heat transfer to the bath during the strong endothermic reactions of limestone and ore; (*b*) a high rate of oxygen input from the lances so as to generate heat directly in the bath by direct oxidation of the metalloids charged with the hot metal. (3) *During the period from bath melted to tapping, oxygen is injected from the lances at a high rate to accelerate decarburisation.*

Table 4 shows the standard combustion practice adopted with the intensive use of oxygen and Table 5 compares the results with normal heats and heats with the intensive use of oxygen.

TABLE 5.—*Comparison of Results with Normal Heats and Heats with Intensive Use of Oxygen. Heats with 60-65 per cent. Hot Metal.*

	Twenty normal heats with limited use of oxygen in refining	Seventy heats with intensive use of oxygen in combustion and refining.
Average oxygen in combustion, cub. m./h.	—	1,846
Average oxygen in combustion mixture, per cent.	21.0	24.9
Oxygen consumption in combustion, m³	—	6,075
Oxygen consumption in combustion, cub. m./ton	—	25.55
Average oxygen for decarburization, cub. m./h.	1,127	1,670
Oxygen consumption for decarburization, cub. m.	909	1,340
Oxygen consumption for decarburization, cub. m./ton	3.78	5.72
Total oxygen consumption, cub. m./ton	3.78	31.27
Heat consumption, kcal./ton	799	557
Charge time, h ; min.	1 : 20	1 : 14
Start-charge to 1st hot metal, h : min.	2 : 37	1 : 52
Start-charge to 1st sample, h.: min.	5 : 32	3 : 18
C at 1st sample, per cent.	0.93	0.99
1st sample to tap, h.: min.	2 : 07	1 : 26
Charge to tap, h.: min.	7 : 39	4 : 44
Tap to tap, h.: min.	8 : 19	5 : 23
Yield per heat, tons	240.18	237.76
Tap-to-tap rate, ton/h.	28.90	44.19
Increase in productivity, per cent.	—	52.9

Cost of Steel

The question of the cost of steel produced by intensive use of oxygen had been examined with particular care. With this in view, 139 heats had been investigated, all carried out with 60 per cent. hot metal and with the same type of charge of scrap and fluxes. For each of these the costing department had calculated the production costs. With intensive use of oxygen at a rate of about 32 cub. m./ton, a reduction in production costs of about 7.2 per cent. was achieved. Taking into account the increase due to greater refractory consumption, which added 3.1 per cent. to the production costs, the final cost reduction was about 4.1 per cent.

It was, in addition, clear that the increase in production was an appreciable gain in itself because of the reduced depreciation, the possibility of larger sales in periods of high demand, and finally the saving in the plant costs which would otherwise be needed to achieve this increase in production.

Utilization and Annual Production

It was of interest to estimate the increase in annual furnace production by intensive use of oxygen, taking into account the variation in hourly production and the variation in the utilization factor (taken as the ratio of operating hours to clock-hours). In fact, while it could be held that the utilization factor remained constant for small variations in heat times, this assumption was not

admissible when there was a large variation. On the other hand, as far as refractory consumption was concerned, it must be considered that life was reduced, at Cornigliano, by about 15-20 per cent., after changing from normal operation to operation with intensive use of oxygen.

Calculations made on the basis of these assumptions showed that if productivity increased by 53 per cent. (as at Cornigliano), annual production only increased by 40 per cent., because at the same time the utilization factor was reduced. A furnace with a normal production capacity of 220,000 ton/year could with intensive use of oxygen produce 300,000 ton/year when the above general operational conditions were fulfilled.

Although the achievements at Cornigliano have been somewhat spectacular, Mr. Massobrio made it clear that the final state of development of this technique had not yet been reached. Various operating experiences indicated a number of ways in which improvements could be made.

In opening the discussion on the three papers, Mr. R. Jones, of John Summers & Sons, Limited, Shotton, Chester, revealed that, on learning of the oxygen lancing technique at Cornigliano, he had visited the plant and received full information from Mr. Massobrio. This had convinced him of the practicability of the process and, as a consequence, an all-basic furnace had been built at Shotton and operated with oxygen on Cornigliano lines. The furnace now in its sixth operating week had shown an increase in output rate from 21 ton/hr. (including fettling) for normal practice with a silica roof to 38 ton/hr. (including fettling) for the new furnace. Fuel consumption per ton of steel had been reduced to the two thirds of normal practice.

ELECTRIC STEELMAKING SESSION

A full report of this session will appear in due course in the Journal of the Iron and Steel Institute. The session was of special interest because it gave the story behind the decision to build at Rotherham what will probably be the largest electric steelworks in the world. The following notes are drawn from the paper "The New Electric Melting Shop of Steel, Peech & Tozer," by R. S. Howes and A. Jackson.

In presenting this paper Mr. Jackson explained that the proposal to build a new electric melting shop at Steel, Peech & Tozer had had to be considered as a project of all the four steelworks comprising the United Steel Companies, Limited. The Appleby-Frodingham and the Steel, Peech & Tozer steelworks were the ones mainly concerned in the project. United Steel aimed to be self sufficient in pig-iron and for many years had adjusted its iron production to this end. As it produced some 14 per cent. of the total British ingot production it was necessary to maintain the ratio of usage of pig-iron to scrap at about the national average.

The principal pig-iron producer was the Appleby-Frodingham works, where phosphoric iron was made entirely from a self-fluxing mixture of British ores. Appleby-Frodingham had in the past used molten phosphoric iron and its own circulating scrap in large tilting furnaces. (See Table 6, col. 1). Steel, Peech & Tozer obtained 37 per cent. of its steelmaking materials from Scunthorpe as machine cast pig-iron, the remainder being circulating and merchant scrap. It had two melting shops containing in total 21 cold-charged fixed open-hearth furnaces, most of 110-ton with a few of 65-ton capacity. Samuel Fox & Company was another steelmaking branch in the Sheffield area. This had open-hearth and electric furnaces of 80 ton capacity, and, in addition, some smaller arc and high-frequency furnaces.

Reconstruction Plans

Due to the age of the plant in part, and the increasing efficiency of competitive steelmaking processes, it had become necessary to consider how the 21 cold-charged furnaces at Steel, Peech & Tozer could be replaced by more economic operating units. Table 6, col. 2, showed the raw materials and general operating characteristics for a steel quality group covering a large percentage of its total ingot production.

In this same context it was important to note

TABLE 6.

	Present practice.		Future practice.	
	Col. 1.	Col. 2.	Col. 3.	Col. 4.
	Appleby-Frodingham melting shops Standard O.H.	S.P.T. cold charged open hearth.	Ajax process.	S.P.T. electric-arc furnaces.
Mixer metal (cwt./ton ingots)	14.95	nil	21.2	nil
Cold pig (cwt./ton ingots)	nil	8.40	nil	nil
Scrap (cwt./ton ingots)	5.70	13.95	nil	21.42
Finishings (cwt./ton ingots)	0.205	0.18	0.21	0.16
Pit scrap (cwt./ton ingots)	0.87	0.80	0.75	0.54
Ore (cwt./ton ingots)	2.24	0.54	1.73	0.18
Slag made (cwt./ton ingots)	2.42	4.25	3.00	1.53
Limestone (cwt./ton ingots)	1.25	nil	1.00	nil
Lime (cwt./ton ingots)	0.12	1.67	0.52	0.76
Fluorspar (cwt./ton ingots)	nil	0.19	nil	0.14
Dolomite (cwt./ton ingots)	0.67	0.76	0.58	0.20
Fuel (therms)	45.6	60.0	9.0	nil
Oxygen-lancing (cub. ft.)	nil	nil	1,260	150
Oxygen-combustion (cub. ft.)	103	nil	150	nil
Power (units)	—	—	—	525
Electrode (lb.)	—	—	—	9.5
Ton/hr.	15.7	8.9	29.0	29.5
Ton/furnace week	2,640	1,495	4,875	4,950
Availability, per cent.	89.8	85.5	91.0	94.5
Brick consumption—				
Silica (lb.)	26.14	44.8	1.24	10.0
Firebrick (lb.)	3.27	24.6	1.33	—
Magnesite (lb.)	2.08	0.2	0.95	10.5
Chrome-magnesite (lb.)	5.88	13.1	13.52	—
	37.37	82.7	17.04	20.5
Tapping capacity (tons)	300	110	200	110

	C.	P.	Mn.	S.	Si.
Iron analysis (cold pig)	3.65	1.35	0.90	0.050	0.65
Mixer metal analysis	3.4	1.15	0.40	0.045	0.25

the comparable factors in the steelmaking at Appleby-Frodingham (some 45 miles away) because this had an important bearing on the problem under consideration. (See Table 6, col. 1.) It should also be noted that the overall usage of steelmaking metallic raw materials in these two plants must continue in the same ratio in total, *i.e.*, a change in the usage in one plant would call for an opposite change in the other.

Various possible solutions to the problem of replacing Steel, Peech & Tozer's melting shops were considered and, finally, it became evident that electric furnaces installed on the present open-hearth shop site would give an economic replacement.

At this time Appleby-Frodingham was beginning to obtain results on its Ajax oxygen steelmaking process, which was proving to be more efficient using 100 per cent. molten metal than its traditional process using 76 per cent. molten metal and normal circulating scrap. As soon as this process was proved to a reasonable degree, it brought forward a significant new possibility, *i.e.*, to send Appleby-Frodingham circulating scrap to Sheffield instead of cold pig-iron so that the electric furnaces could operate close to 100 per cent. scrap. This obviously reduced slag volume and the necessity for its removal with such increase in production rate that the initially projected seven-furnace plant could be reduced to six furnaces.

The revised raw materials distribution could be seen by reference to Table 6, col. 1, showed the former standard open-hearth practice at Appleby-Frodingham Steel Company, which gave best results, either more or less scrap decreasing output progressively from this optimum. The Ajax process figures were shown in the same table (col. 3) and were based on the 200,000 tons of ingots produced recently. They showed a considerable improvement on the early Ajax practice as already published (Journal, Iron and Steel Institute, September, 1958, and May, 1959).

The arc furnace figures (col. 4) were derived (*a*) from work on Steel, Peech & Tozer small arc furnace, (*b*) from published information, (*c*) but were confirmed as fully as possible by operating an 80-ton arc furnace at the Samuel Fox works of the company for a month, using the proposed Steel, Peech & Tozer mixtures and making the types of steel they expected to require.

Comparison of Steelmaking Methods

The following figures were used as a basis of comparison:— (1) Out of the ingots produced by the two plants together, about 58 per cent. had been produced at Appleby-Frodingham and 42 per cent. at Steel, Peech & Tozer, and it was expected that this ratio would remain about constant. (2) 100 per cent. molten iron in the Ajax process and 100 per cent. scrap in the arc furnace (a small degree of interchange is practicable).

Mixture—The use of open-hearth furnaces at both plants required in total 61 per cent. of pig-iron, while the new methods would require 61.5 per cent. The ingot yield calculated on charged pig-iron, scrap, and Fe from ore was 88.54 per cent. and 89.46 per cent., respectively, a gain of 0.92 per cent.

Fuel—Comparison of costs of fuel, oxygen for lancing and combustion, electrodes, and power (arc furnaces only) showed no significant difference between past practice and the new practice, taking the two plants together in each example.

Production rate—The production per operating furnace had increased by over 80 per cent. using the Ajax process and by 350 per cent. from the new arc furnaces, thereby giving material reduction in working costs.

Refractories—Refractory brick consumption and fettling dolomite showed marked reduction in costs.

Slag and lime—The total lime consumption of slag volume produced has fallen. More slag is, however, made in the Ajax furnaces and it contains a higher phosphoric acid content than formerly. However, whereas Steel, Peech & Tozer always discard its slag, Appleby-Frodingham would, under the new scheme sell more fertilizer slag.

New Electric Melting Shop

Mr. J. D. Wright, of Steel, Peech & Tozer, speaking on behalf of Mr. R. S. Howes, who was absent through illness, said that when conversion plans were complete, the plant would consist of six 24-ft. dia. electric-arc furnaces, each tapping 110 ingot tons. Each furnace would be powered by a 40,000-kVA transformer and fitted with 24-in. dia. graphite electrodes. The bulk of the steel qualities would be made using a single slag technique, and ladle finishings, from a charge consisting of 100 per cent. scrap with sufficient anthracite to give a 0.40 carbon boil. For the alloy qualities at present made by the acid open-hearth process, and for steels of conventional electric quality, a short reducing slag period would probably be necessary giving a double slag practice. In those cases, where low gas content was important, it might well prove advisable to revert to bath or even ladle finishings. For extreme cases, and certainly with the heavy forging ingots, vacuum casting presented a proven means of producing low-hydrogen steels.

Arrangements were to be provided for vacuum casting ingots up to 100 tons in weight.

In conclusion, Mr. Wright said that when completed, this new shop would produce the equivalent of 6 per cent. of the present UK ingot production and double the existing electric steelmaking capacity.

DETERMINATION OF GASES IN METALS

Organization of the symposium on the determination of gases in metals was the responsibility of the Society for Analytical Chemistry, the Iron and Steel Institute, and the Institute of Metals. The papers presented at this successful two-day meeting were:—

"Sampling of Liquid Metals," by T. B. King; "The Determination of Oxygen in Metals: a

Review," by W. T. Elwell; "The Determination of Gases in Metals by Vacuum-fusion," by J. E. Still; "The Determination of Gases in Metals by the Semi-micro Vacuum-fusion Technique," by A. Parker.

"An Assessment of Carrier-gas Methods for the Determination of Gases in Metals with Particular Reference to Steels," by C. E. A. Shanahan; "The Determination of Oxygen in Beryllium by Activation Analysis," by R. F. Coleman; "Emission Spectrometric Determination of Oxygen, Nitrogen, and Hydrogen in Metals," by V. A. Fassel.

"The Determination of Nitrogen in Metals: a Review," by J. D. Hobson; "The Determination of Nitrides in Metals" by H. F. Beeghly; "The Determination of Hydrogen in Metals: a Review," by R. Eborall; "The Determination of Hydrogen in Cast Iron" by J. V. Dawson and L. W. L. Smith; "An Improved Carrier-gas Technique for the Determination of Hydrogen in Steel" by F. R. Coe and N. Jenkins; "X-ray Emission Analysis and the Determination of Gases in Metals," by T. Mulvey; "Application of Internal-friction Measurements to the Study of Gases in Metals," by G. M. Leak.

Hard-chrome Deposition

ENLARGEMENT and re-equipping of its Durion hard-chrome deposition plant is announced by Holman Bros., Limited, Camborne (Cornwall). The plant handles all chrome-processing work for the Holman group and holds under licence the exclusive agency for the process in the west of England.

Hard-chrome deposition has applications in general engineering, mining, and in the manufacture of screens. The process involves basically the electrodeposition of hard chrome, after varying and exacting pretreatments, direct on to ferrous or non-ferrous materials. The chrome is deposited electrolytically, and bonds intermolecularly with the base metal. The thickness of the deposition can be varied from 0.00005 in. to more than 0.10 in. and in exceptional cases, particularly in the salvage of stainless steel parts, 0.20 in. has been deposited.

The rate of deposition depends on the size and shape of the components, but an average figure would be a rate of approximately 0.001 in./hr.

Standard for Pit Tubs

DEALING with haulage rolling stock with capacities up to 60 cub. ft. employing fixed or loose wheels, BS 3237:1960, Light and Medium Rolling Stock for Mineral Haulage in Mines, specifies materials and requirements for basic design and construction of the body and the underframe and provides detailed specifications of materials and dimensions for wheels, axles, and pedestals.

Requirements of drawgear assemblies are also given, including specification of hooks and design data for other drawgear components, and guidance is provided on information required when ordering components.

Price of the specification is 15s.

FORTHCOMING EVENTS

MAY 13

Midland Counties Institution of Engineers: Meeting at the Mines Rescue Station, Ashby-de-la-Zouch, at 4.30 p.m. "The Application of the Monoveyor at Donisthorpe Colliery," by S. A. McKee.

Institution of Plant Engineers: Meeting at the Royal Society of Arts, John Adam Street, Adelphi, London, W.C.2, at 7 p.m. "Factory Safety," by a member of HM Factory Inspectorate.

MAY 18

South Wales Institute of Engineers: Meeting in Cardiff at 5 p.m. "The Aberthaw Power Station," by W. Wilde.

MAY 23

Institute of Fuel: Meeting at the Institution of Civil Engineers, Great George Street, London, S.W.1, at 5.30 p.m. "Recommendations on Heights for New Industrial Chimneys," by G. Nonhebel.

MAY 24

Institution of Plant Engineers: Meeting at the South Wales Engineers' Institute, Park Place, Cardiff, at 7.30 p.m. "Controlled Maintenance," by G. E. Halter.

MAY 27

Midland Institute of Mining Engineers: Annual dinner at the Grand Hotel, Sheffield, at 7 for 7.30 p.m.

MAY 29—JUNE 11

Iron and Steel Institute: Special meeting in Italy, including a joint meeting with the Associazione Italiano di Metallurgia in Milan on May 30 and 31.

National Association of Colliery Managers

JUNE 1-3

Annual general meeting and conference at Southport (Lancs).

Durgapur's Tar Distillation Plant Completed

DURGAPUR steelworks' tar distillation plant, which, when in full production, will distil 230 tons per day of crude tar from the coke oven by-products plant to produce pitch creosote, road tar, preservative creosote, naphthalene, and benzol, is ready for operation. The crude tar from the coke-oven by-products plant will be passed successively through heat exchangers and a distillation column which separates the pitch from the other oils. The process employed is Wilton's continuous tar distillation.

In the blending plant, pitch and creosote oil will be blended into pitch creosote for use as fuel in the steelmaking plant. This plant can also produce road tar, together with creosote for preserving wood; it will also be available for sale. Facilities are provided for road tar to be loaded to road or rail tankers for the purpose of commercial distribution.

The plant is part of the integrated steelworks being built for Hindustan Steel, Limited, by ISCON, the British consortium.

ALMOST ALL the available space at the Laboratory Apparatus and Materials Exhibition, which is to be held at the Royal Horticultural Society's New Hall, Westminster, London, S.W.1, from June 20 to 23, has now been booked. Requests for well over 2,000 tickets have been received from industrial and academic research units throughout Great Britain and in many parts of the world.

Briquetting Coal Without a Binder

DEVELOPMENT OF A NEW PROCESS

REFERENCE to current literature will show that many unsuccessful attempts have been made to find an economic binderless briquetting process, but in each case either the pressures used to compact the coal were too high for economic operation—12 to 15 ton/sq. in.—or coal had to be ground to an extreme fineness. For the last five years the National Coal Board's Coal Research Establishment has been trying to establish a binderless briquetting process in order to solve this and associated problems.

A paper presented by H. R. Gregory to the Institute of Fuel deals with the research and describes the work which has led to the building of a pilot plant using this new technique. The paper is summarized below.

Principles of Compaction

In order to obtain a compact material of high strength it is necessary to ensure that the compaction technique is effective in bringing about the necessary increase in density and that the compact suffers no damage during extraction from the mould. With coal, at any rate, the strength of a compact for any given size distribution and any given mode of preparation is related to the density of the compact. The density and the strength are determined by the pressure which is applied, but ultimately they approach limiting values which are not exceeded by further increase in pressure. The limiting density of the compact falls short of the density of the material of the powder by an appreciable margin, say, 4 to 20 per cent., depending on the material used.

This failure to achieve complete compaction arises in two ways. First, as the briquetting pressure is applied it is opposed by forces set up in the powder and by fractional forces on the walls of the mould which resist the movement of the particles and prevent intimate contact between the surfaces of the particles. Second, when the external pressure is removed the deformed particles recover their shape elastically, in part at least, and the compact expands; the voids within it increase and residual strains remain.

It has been found that the density of a powder compact can be materially increased for a given applied pressure, if, while still under load, it is subjected to shear strain: the strength is increased and the elastic recovery is reduced. The gain in strength with the application of additional shear strain under load may be substantial, but the full benefit is obtained only if the shear strain is introduced under maximum load. The compact made in this way may possess greater density and strength than the limiting values obtained by simple pressing.

It is possible in the laboratory to make apparatus which will apply a known amount of shear strain more or less uniformly throughout a mass of particles: such an apparatus is a rotary shear box or an annular shear box. Experimental work with this type of apparatus permits a fairly accurate examination of the effect of shear strain to be made. There is a theoretical limit to the amount of shear strain that can be introduced; at high shear strains and with unfavourable stress distributions, slip-plane failure results. However, shear strain applied at pressures below two thirds the maximum is, in the case of coal, valueless. The successful making of high-density compacts may be summarized as the introduction of the highest possible shear strain at the maximum pressure, the upper limit of shear strain being set by the development of slip-plane failure.

The germ of a commercial application of the process is to be seen in a two-stage compaction process in which a mass of particles placed in a mould is first compacted with a plane-ended punch (I) and then with punch (II) profiled as in Fig. 1. The first compact made in the mould exerts a very considerable lateral thrust on the walls, and even after the plane punch is removed, the particles are still under considerable load when the profiled tool is pressed into the first-formed briquette. The shear strain which then occurs does so under very considerable pressure. This method of compaction can be developed into a commercial machine in which a composite plunger is used to form a powder into a briquette.

Economics of the Process and its Application

The crux of the process when applied to black coal is its cost (23s. 6d. per ton). The present price structure of the British coal industry determines that the cost shall not exceed 30s. per ton (1959). This has to include the cost of handling, prepara-

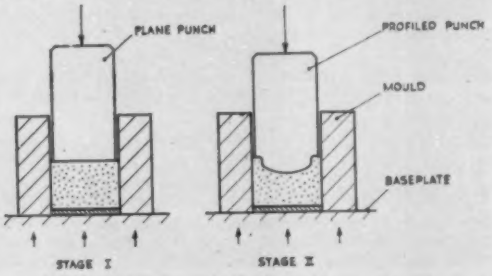


FIG. 1.—THE DOUBLE PLUNGER METHOD.

tion, and briquetting. For black coal there is an optimum moisture content, some 50 to 100 per cent. of the air-dry value, and while good-quality briquettes can be made from fairly coarse coal, in general the finer the grind the better the briquette. The quality of the product also improves with briquetting pressure, although low pressures of 4 to 6 ton/sq. in. are adequate. It is important, therefore, to know the costs associated with each part of this process in order to determine wisely whether to invest in critical preparation in regard to moisture, finer grinding, or higher briquetting pressure.

The compaction process described was developed by the scientific department of the National Coal Board for use with coal, but it is not limited to that only. High-rank coal, with a volatile-matter content of about 17½ per cent., when briquetted by this process, burns more freely in the open grate than the parent coal, and is a possible fuel for smoke-controlled areas. This high-rank coal without briquetting is usually friable and because of this is usually supplied to power stations—a misuse of low-volatile material. The great coal reserves of the UK are in the coal ranks 700, 800, and 900, with volatile matter contents between 34 and 42 per cent. These coals are not smokeless and the only merit in briquetting them raw is to convert small coal into large coal. Experimental expansion presses have been built which will de-water and briquette raw coal fines in one operation.

The carbonization of dense direct or binderless briquettes in conventional equipment can have surprising results. A 900-rank coal may carbonize well enough to make coke of blast-furnace or foundry quality. It is unlikely that it would be economic to make a smokeless domestic fuel in this way as the cost of conventional carbonization is high; but it is certain that coal fines which cannot be coked in the ordinary way may, by this process, be converted at some cost into high-quality metallurgical fuel. This may be important in countries which do not have good coking coal.

The carbonization of low-rank coal in a fluid bed followed by binderless briquetting of the char to form a premium smokeless domestic fuel is an application of great promise; more will be heard of it.

The process described, as already stated, will be successful or not according to its cost, and it is for this reason that a plant in South Wales has been built. Previous processes have failed either because the pressure required was too high or because the preparation requirements were too stringent. In this case research has devised a process which uses only moderate pressure and requires no costly preparation of the coal.

PRODUCTION OF bituminous coal and lignite in the US during March, according to the Bureau of Mines, US Department of the Interior, was 38,200,000 net tons in 27 working days, compared with 33,910,000 net tons in 25 days in the previous month. Output in March, 1959, was 35,229,000 net tons in 26 days.

Robinson Shearer Drum

DESIGNED to replace the standard cutting drum of the Anderton shearer loader, a fabricated drum has been designed by Mr. S. G. Robinson, mechanization team leader in No. 7 Area of the East Midlands Divisional Coal Board. Anderton machines fitted with the Robinson drum are in use at several collieries in the division.

As will be seen from the accompanying photograph, the drum consists of a number of pockets, on the periphery of which pick boxes are mounted. Two rows

ROBINSON SHEARER DRUM.

of pick boxes are provided at the face side of the drum to give a close pick sequence on the 4 in. nearest to the coal face. The rest of the drum has a special semi-helical pick lacing and the drum is cut away between these helical rows of picks to form pockets: these pockets allow large coal to pass freely round the drum and also prevent recirculation.

Use of the Robinson drum has increased operating speeds and reduced power consumption compared with the conventional drum.

UNDER AN AGREEMENT between Reed Bros. (Engineering), Limited, London, S.E.18, and the Lombard Corporation of Youngstown, Ohio, USA, Reed Bros. is responsible for the selling and manufacturing of the complete range of Lombard mechanical and hydraulic drawbenches in Great Britain.

Coal Reserves in Northern Rhodesia

"A NATIONAL asset which could prove of value in the future . . . although it is unlikely to be of immediate economic importance," is how a seam of coal discovered at Kandabwe, in the Gwembe area of the Zambesi valley, Northern Rhodesia, is described in a report from the Ministry of Labour and Mines.

The report, "The Karro System and Coal Resources of the Gwembe District, South-west Section," with maps, is published by the Government printer, Lusaka, at 30s. It has been prepared by Mr. R. Tavener-Smith, a geologist formerly with the Geological Survey Department of the Ministry of Labour and Mines.

Results of a detailed investigation of coal resources of the Gwembe area are given in the report. Six of the seven deposits in the area are dismissed as of no economic importance. The seventh is the Kandabwe Seam, discovered in 1952 when local Africans drew attention to a thick bed of coal exposed on the banks of the Kandabwe river. Development work by shaft sinking along the strike began in the middle of 1953.

Drilling operations proved that the length of the main seam was about four miles and that the variation in thickness was between 22 ft. and 7 ft. Total proved and possible reserves of the deposit amount to about 17,000,000 long tons, after making a 20 per cent. allowance for irrecoverable coal.

The report states that the quality of the coal in the seam might fairly be described as low grade. Analyses of more than 300 samples showed that the average ash content was of the order of 24 per cent. and that the calorific value was 10,200 B.Th.U./lb. Rather better values were produced by analyses of the lowest 6 ft. of coal in the area of proved reserves.

Because of the high angle dip in the seam and the nature of the overburden, open-cast mining would not be practicable, Mr. Tavener-Smith says. The steepness of the dip would probably make mining methods more expensive than at the Wankie field in Southern Rhodesia, with which, geologically, the Kandabwe deposit has an overall similarity. "It appears that the immediate prospects for development of the Kandabwe area are not good, though much would depend upon the price at which the coal could be marketed and the demand that could be created for it in the face of competition from Wankie and the coalfields of the Union of South Africa. Nevertheless, the existence of a small potential coalfield has been proved where none was suspected, and there could be no doubt that in more favourable circumstances the coal would certainly be worked."

Mr. Tavener-Smith concludes: "The whole of the Karroo rocks and the Gwembe District have now been investigated with special regard to their coal resources. . . It seems likely that enough is now known regarding the cause and effect of coal formation in the Gwembe District to state that, under the prevailing conditions, the formation of thick seams of coal must have been a rarity and the combination of circumstances which led to the deposition of the Wankie coal is unlikely to have been repeated elsewhere in the region."

NCB Uses Parker Mobile Screening Plant

MOBILE screening plant, made by Frederick Parker, Limited, Leicester, and built specially for the National Coal Board, is being used at a colliery in the East Midlands Division to rescreen coal from stockpiles.

The plant, which is mounted on pneumatic, rubber-tyred wheels, consists of a 4 cub. yd. capacity hopper, mounted above a 48-in. by 96-in. single-deck "Rapide" two-bearing, free-floating type vibratory screen, and two conveyors for loading direct into lorries or stockpiling. It is seen here rescreening Hazel doubles to remove minus ¾-in. slack.

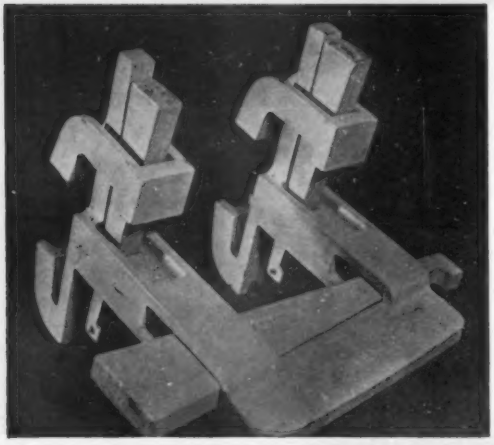
THE NCB'S PARKER MOBILE SCREENING PLANT.

Bretby Horsehead Bracket

CENTRAL Engineering Establishment of the National Coal Board was responsible for designing the Bretby horsehead supporting bracket to provide a rigid connection for two joists or similar members crossing each other. The object in designing the bracket was to lock forepole girders to mine roadway arches, but the design will obviously have much wider applications. The bracket, as the accompanying photograph shows, has a "U"-shaped main body inside which the forepole girder is supported. The ends of the vertical arms of the "U" are shaped to form hooks which are locked on to the bottom flange of the roadway arch.

Of the two pairs of hooks which lock on to the arch flange, one of each pair is integral with one arm of the "U" and one is independent of the arm, but is so slotted that it will ride upon a rectangular guide arm: these guide arms, as can be seen in the photograph, are integral with the "U" arms and on the opposite side of the arms to the fixed hooks. Each pair of hooks on the "U" arms is provided with a small wedge which, when driven in, securely locks the bracket to the upper member. When the wedge is loose the independent hook is free to slide along the guide arm, but the arm is provided with a stop to prevent the hook becoming detached from the bracket. The wedges are also provided with stop pins after assembly to ensure retention in their respective slots.

The sides of the "U"-shaped body are slotted to allow a long wedge to pass through both sides. The cross bar of the "U" body has a sloping top edge to contact with the tapered lower edge of the wedge. The untapered top edge of the wedge is thus parallel with the bottom flange of the forepole girder, and when the wedge is driven in, it forces the forepole girder against the arch and locks them together by friction. This long wedge is also fitted with a stop pin to retain it in position in the bracket.



BRETBY HORSEHEAD BRACKET.

The width and depth of the "U"-shaped body can be arranged to fit any size of cross member, and the long wedge can be thinner or thicker to give a range of adjustment.

The sliding hooks will accommodate the whole range of standard arch sections normally used in underground workings.

Auchengeich Colliery Fire Report

AT Auchengeich Colliery (Lanarkshire) on September 18 last, 47 men on a man-riding train underground in a return airway died from asphyxia due to poisoning by carbon monoxide contained in smoke from a fire which originated in the driving belt of a booster fan farther inbye and spread to wood props and laggings used as roof supports.

Mr. T. A. Rogers, HM Chief Inspector of Mines and Quarries, held a public inquiry into the accident in Glasgow from January 4 to 15, and he has now made his report.

The fire would probably have been averted had the fan been under continuous supervision, the Chief Inspector states. It might have been averted or its development halted had the fan been inspected at the half-hourly intervals prescribed as a maximum by regulation.

Mr. Rogers states that the belt which caught fire was not of the 33½-oz. weight ordered by the National Coal Board, and failed to satisfy completely some of the tests prescribed by British Standard 2066. He recommends that all power transmission belts used at collieries should be made of fire-resistant material.

He finds that the fire originated in the balata transmission belt of the electrically driven booster fan in the return airway from No. 2 Pit workings. It was caused by frictional heat generated between the rotating motor pulley and the belt, which had left the fan pulley and jammed near it. Flame from the belt ignited oil vaporized from the fan shaft bearings and oily deposits in and around the fan. The flame then spread downwind to ignite roadway timbers.

By tragic coincidence, 48 men riding the return airway were overtaken by smoke containing carbon monoxide and 47 of these men were asphyxiated.

Haze preceded the smoke, but it was not recognized, either by officials or workmen, as a sign of imminent danger. By the time the fire was found the second man-riding train had already left the pit bottom.

Metallurgical Patents in the US

Some Recent Inventions

THE followinng descriptions for metallurgical patents have been taken from details given in the Official Gazette of the United States Patent Office.

Method for Producing Ingot Mould Stool

A method of making a mould stool comprises compacting in a mould flask a body of moulding sand to present a substantially plane upper surface, applying to the surface a sheet of non-combustible fibrous material coextensive with an area of the surface larger than the area of the upper surface of the stool to be formed, then positioning on the sheet a pattern conforming in part to the stool, compacting moulding sand about the periphery of the pattern and against edge portions of the sheet projecting laterally therebeyond, removing the pattern, placing a metal slab over the cavity vacated by the pattern, pouring molten ferrous metal into the cavity and, after the metal has solidified, removing the stool and inverting it whereby the surface formed by solidification of the metal while in contact with the sheet becomes immediately available as the mould receiving surface of the stool.—2,922,207.

Blast-furnace Stove Gas-port and Burner Nozzle Connection

A hot-blast stove has a gas-port and a retractable burner nozzle movable to and from an operable firing position relative to the gas-port. In combination a sealing device comprises a pair of annular metal housings fixed, respectively, to the stove and nozzle, water inlet and outlet connections to both the housings for circulating cooling water. A resilient sealing ring is fixed to one of the housings and extends in an axial direction therefrom, the other housing having a flat annular surface aligned with the ring and adapted to be engaged thereby to prevent escape of gases between the port and nozzle. One of the housings has an annular flange located radially inwardly of the sealing ring and a flat annular surface located radially inwardly of the flange, the other of the housings having an annular projection aligned with the second named surface for engagement therewith. The flange and projection co-operate to provide a baffling action on escaping gases before they reach the ring.—2,924,269.

Skull-type Furnace

A metallurgical furnace for melting and casting highly refractory and reactive metals comprises a substantially gas-tight housing having a roof and side portions, a graphite layer adjacent to the roof, and side portions comprising thermal insulation. A crucible is mounted within the housing and within the thermal insulation, the sides and the floor of the crucible being in spaced relationship to the insulation. The upper edge of the crucible is in engagement with the thermal insulation. Electrode heating is disposed within the crucible for heating the interior thereof, while supplemental electrical heating surrounds the crucible and is interposed between the latter and the thermal insulation. The supplemental heating is disposed peripherally about the sides of the crucible and extends substantially below the lowermost level of the crucible. Porous carbon blocks and graphite block support the crucible, which has an aperture in the bottom through which metal may be cast, and a substantially gas-tight mould chamber positioned beneath the metallurgical furnace for containing a mould, the latter being positionable beneath the aperture.—2,925,636.

Heat-treating Furnace

A heat-treating furnace comprises a thermally insulated furnace housing, having means for guiding a strip to be treated moving in a vertical direction and longitudinally through the furnace housing, a thermally insulated baffle surrounding the strip within the housing. Means provide for introducing gas to flow through the baffle and from the baffle through the space between the baffle and the furnace housing, and also for controlling the flow of gas to the space between the baffle and the housing to maintain the strip at a desired temperature within the baffle.—2,926,902.

Bustle Pipe for Blast Furnaces

A bustle pipe for blast furnaces includes an annular housing having overall a substantially constant cross-section, an air inlet to the housing, and a plurality of tuyeres for blasting air from the housing into an associated blast furnace. An improvement comprises means located in the housing and dividing it in two snail-shell-formed chambers with opposite windings and along the circumference of the housing, gradually changing the cross-sections of the chambers in accordance with the quantity of air divided in two streams and passing through the housing, so as to ensure that both streams of air have the same velocity of flow but in opposite directions at each of the tuyeres. Thus, each tuyere is traversed by a quantity of air one half of which has reached the tuyere from the air inlet via a relatively short path, and the other half of which has reached it from the inlet via a correspondingly and complementarily longer path.—2,926,903.

Powder Metallurgy Joint Group

NEXT meeting of the Powder Metallurgy Joint Group of the Iron and Steel Institute and the Institute of Metals will be held at Church House, Great Smith Street, London, S.W.1, on December 15 and 16. One day will be devoted to a symposium on "The Practical Aspects of Pressing Metal Powders."

There will be discussions on papers which have been offered and accepted for printing in Powder Metallurgy, the half-yearly periodical of the group, on the second day.

The committee of the group emphasizes that it is not its intention that group meetings shall be restricted to the discussion of invited papers on particular themes; it is hoped that the meetings may, in fact, be devoted to the discussion of scientific and technological papers which have been submitted for publication without invitation.

New Literature

NEW catalogues, booklets, and other publications which have recently been received include the following, which are acknowledged with thanks.

UNION FIBRE PIPES (GREAT BRITAIN), LIMITED, Tolpits, Watford (Herts)—A leaflet gives details of a number of additions to the company's range of fittings.

MORGAN REFRACTORIES, LIMITED, Neston, Wirral (Ches)—March issue of the Morgan Refractory News gives details of the use of the company's refractory products in marine boilers.

DAVY & UNITED ENGINEERING COMPANY, LIMITED, Darnall Works, Sheffield 9—A survey of the varied activities of the Davy-United group is contained in an attractive broadsheet just issued.

D.M.M. (MACHINERY), LIMITED, 60, Buckingham Palace Road, London, S.W.1—A leaflet describes the "Ribback" hammer forging machines of Usine de Wecker S.à.r.l., Wecker, Luxembourg.

INCANDESCENT HEAT COMPANY, LIMITED, Cornwall Road, Smethwick, Birmingham—Leaflet No. V.59 (1), entitled "Incandescent Gas Atmospheres Division—What We Make," is the first leaflet of a series to be produced for that division.

MORGAN CRUCIBLE COMPANY, LIMITED, Wandsworth Works, Point Pleasant, London, S.W.18—Information on the company's new basin tilter is contained in In the Melting Pot, a foundry news bulletin, the February issue of which is just to hand.

GEORGE KENT, LIMITED, Luton (Beds)—Latest catalogues from this company deal with primary elements for temperature measurement (No. 349) and the Commander boiler-test indicator (No. 365), both giving full information concerning the equipment and being well illustrated.

CONSOLIDATED PNEUMATIC TOOL COMPANY, LIMITED, 232, Dawes Road, London, S.W.6—A 34-page catalogue (No. 55) describes the company's range of mining equipment. The several sections are clearly set out and well illustrated. The specifications of each class of product are given in concise tabular form.

HEAD WRIGHTSON TEESDALE, LIMITED, Teesdale Ironworks, Thornaby-on-Tees—The company, which has, for a number of years, manufactured special-duty rolling stock, under licence to the Treadwell Company of America, has produced a brochure covering the mixer-type hot metal cars now being adopted by many steelmakers in the UK.

FOUNDRY SERVICES, LIMITED, Long Acre, Nechells, Birmingham 7—The technical service section of the latest issue of Foseco Foundry Practice (No. 139) is devoted to an investigation by the company's service personnel on defects in an aluminium alloy casting. "Shrinkage Porosity—Why and How it Occurs" and "A Word About Pyrometers" are other features.

INDUSTRIAL HYDRAULICS, LIMITED, 101, London Road, Reading (Berks)—Three new series of hydraulic accumulators have been added to the company's existing range. The accumulators which embody the patented liquid seal piston assembly designed to overcome the problem of sealing the gas charge when the hydraulic system is shut down, are described in leaflet ACC/2.

KEITH BLACKMAN, LIMITED, Mill Mead Road, London, N.17—Publication No. 51 illustrates and describes the Tornado-Fischer automatic self-cleaning filter, a piece of equipment new to this country. Its efficiency in handling dust particles of virtually all sizes rests on the special design of the filter elements, the type of filter fabric, and the patented cleaning mechanism. The Tornado-Solivore wet scrubber, Vicard process, for collecting fine dusts and fume down to 0.1 micron dia. or even smaller, is described in Folder No. 8.

Coal Washery at Durgapur in Operation

OPERATIONS have commenced at the coal washery at the Durgapur steelworks. The capacity of the washery is 360 ton/hr. Raw coal above ½ in. in size is treated in the dense medium section of the plant, which uses a finely ground suspension of magnetite ore in water. The raw coal below ½ in. passes to a feldspar jig. This section of the plant is equipped with a very extensive water clarification unit, which is an important feature in the treatment of small coal.

Raw coal from the Jharia coalfield is crushed to 3 in. and conveyed to the washery via a 100-ton balance bunker. The coal-washing process is in accordance with the most recent British practice and automatic control is introduced to ensure uniformity of the products.

The design of the washery has been evolved to suit Indian climatic conditions and each wall is equipped with adjustable louvres to obtain the best conditions of ventilation. The building is a concrete structure and is consequently cool and spacious. The washery was designed and built by Simon-Carves, Limited, a member company of Iscon, the British consortium constructing the steelworks at Durgapur. The key Hindustan Steel, Limited, Indian operators were trained by Simon-Carves on a modern plant of similar type in the UK.

THE COAL WASHERY AT DURGAPUR.

THE COAL TRADE

MERCHANTS are reasonably optimistic about summer trading and, probably because of the regular and widespread advertising campaign, householders are showing a growing predisposition to building up stocks at the favourable summer prices. The demand for the proprietary manufactured fuels, which has been well maintained throughout the winter, shows signs of slackening, but sufficient good quality anthracite is still difficult to obtain.

SCOTLAND

Glasgow—The volume of business is considerably below the standard of the first three months of the year. The summer reduction in house coal prices has not stimulated demand to any marked degree and, despite the cutback in output, all seven groups of smalls can readily be obtained by merchants, with the exception of group 1 which is very restricted. The warmer weather has reduced sales of alternative domestic fuels, including "Coalite," "Rexco," "Phurnacite," and "Warmco," while hard coke nuts, gas coke, and briquettes are also quiet.

Anthracite nuts enjoy a brisk demand, all supplies being guaranteed a clearance since deliveries are several months in arrears and anthracite large has turned easier. Beans are in excess of requirements, and experiments are being carried out to mix them with coke breeze and burn them in glasshouse installations. Low volatile duff finds ready outlets in the export trade but bituminous duff is sticky.

Coking smalls keep exceptionally busy, and appreciable tonnages are being withdrawn. A brisk trade is also passing in singles, with doubles and trebles moving away fairly steadily. Pearls are uncomfortably surplus to requirements, and efforts are being made to popularise them for use in underfeed stokers. Metallurgical coke is very busy, and supplies are adequate. Foundry coke is comfortably balanced against demand.

Fife and Lothians—Trade has turned much quieter in a number of directions, largely because of the reduction in space-heating requirements. Exports continue on a larger scale than last year.

South Wales Ports' Traffic Increase

TONNAGE of traffic through the South Wales ports during the four weeks ended April 24 rose by about 67,000 tons over the figure for the corresponding period last year to a total of 1,259,003 tons. At 845,571 tons, inwards traffic increased by about 31,000 tons. Commodities showing the main increases were iron-ore (up by 75,000 tons), other ores (23,000 tons), and iron and steel goods (12,000 tons). Imports of petroleum decreased by 76,000 tons.

Outwards traffic totalled 413,432 tons—an increase of about 36,000. Commodity increases were:—Petroleum (59,000 tons), tinplate (8,000 tons), iron and steel manufactures (4,000 tons), and vehicles and vehicle parts (2,000 tons). There was a decrease of 32,000 tons in exports of coal, coke, and patent fuel.

Total tonnages handled by the various ports so far this year (with corresponding 1959 tonnages in parentheses) are:—Newport, 716,299 (680,483); Cardiff, 741,754 (615,501); Barry, 418,480 (431,980); Port Talbot, 1,015,301 (831,301); Swansea, 2,546,096 (2,229,531); Penarth, 125,648, (149,982); Lydney, 11,795 (8,456).

Coal Output down by 7 Per Cent.

SO far this year output of saleable coal has been reduced by nearly 7 per cent. of the comparable 1959 total. Deep-mined output is now 4.5 per cent. down on last year, whereas open-cast output has been cut by no less than 35 per cent. For the first 18 weeks of the year nearly 5,000,000 tons less coal has been won. Over a similar period consumption, both home and export, shows almost 2,000,000 tons improvement on 1959.

Except in the domestic sector, there was evidence of some slight restocking in the week ended April 30. Undistributed stocks, however, also rose slightly and once again are over 33,000,000 tons.

There were 610,700 wage-earners on colliery books on April 30, against 669,500 on May 2, 1959, the numbers engaged at the coal face being 234,000 and 259,900 respectively. Total absenteeism (all workers) in the week ended April 30 was 14.3 per cent., compared with 13.52 per cent. in the week ended May 2, 1959. Output at the face was 3.972 tons and overall 1.417 in the week ended April 30, compared with 3.734 and 1.352 tons in the week ended May 2.

The following table gives (in tons) the output of saleable mined coal by division in the week ended May 7, and the tonnage lost through all causes (holidays, disputes, and go-slows):—

Division.	Week ended May 7, 1960.		Week ended May 9, 1959.
	Total output.	Tonnage lost.	Total output.
Scottish	212,600	155,900	223,300
Northern (N&C) ..	240,600	1,700	268,100
Durham	453,300	—	486,700
North-Eastern ..	852,000	13,900	901,000
North-Western ..	270,800	2,800	302,600
East Midlands ..	921,500	—	941,800
West Midlands ..	291,700	200	333,300
South-Western ..	604,000	4,100	437,900
South-Eastern ..	32,900	200	32,500
Great Britain—			
Deep-mined coal ..	3,679,400	178,800	3,927,200
Other deep-mined (including licensed mines) ..	42,800	—	53,300
Open-cast coal ..	175,000	—	251,200
TOTAL	3,897,200	178,800	4,231,700

ASSISTANT MANAGING DIRECTOR of the Ford Motor Company, Limited, Mr. John M. A. Smith has been appointed a part-time member of the National Coal Board. Mr. Smith, who is 57, was educated at Morrison's Academy (Perthshire) and is a chartered accountant. He has been with the Ford Motor Company for nearly 30 years.

Orders Placed

German Die-Forging Press for Japanese Plant

PLANT to manufacture solid wheels and wheel discs, which was built in Japan recently, has been supplied by Schloemann, AG, of Düsseldorf, with a 3,000/6,000/9,000-ton die-forging press and a rolling mill with a guide roller system (DB patent) developed by the German company. The guide rollers provide a three-point bearing for the wheel and hold it in the vertical position during rolling. This means that unpierced blanks can be worked without use of a mandrel.

Material handling and transfer equipment links the individual production units, and the workpiece is mechanically conveyed throughout the manufacturing process from the delivery of the billet to the offloading of the finished wheel. The operating speeds at which the material is dealt with on the belt conveyors and bogies, and by the tilters, loading, and centring devices, are co-ordinated to suit the work cycle of the plant.

ORDERS valued at £2,000,000 for two 22,000-ton bulk carriers have been placed by Scandinavian owners with Sir James Laing & Sons, Limited, Sunderland.

ORDER for four-cylinder diesel engines for use in German-built fork-lift trucks designed in the USA, has been placed with Perkins Engines, Limited, Peterborough.

WILLIAM BOBY & COMPANY, LIMITED, water treatment engineers, of Rickmansworth (Herts), has been awarded a £2,170 contract for a small deaerator for the Metropolitan Water Board.

ORDER VALUED AT £750,000 for 168 Super Comet haulage trucks, 96, Super Comet tippers, and 36 Clydesdale bus chassis, has been received from the Middle East by Leyland Motors, Limited.

CRANE CONTROLS, valued at £120,000, for the new Spencer works of Richard Thomas & Baldwins, Limited, are to be supplied by Brookhirst Igranic, Limited, a member of the Metal Industries, Limited, group.

THREE 1,500 kW pass-out condensing turbo-alternators to be installed in the new passenger liner Northern Star have been ordered by the Parsons Marine Turbine Company, Limited, Wallsend-on-Tyne from W. H. Allen Sons & Company, Limited, Bedford.

Two large packaged boilers have been ordered from Mitchell Engineering, Limited, Peterborough. The first is to be installed at the Windscale plant of the UK Atomic Energy Authority, and the second is for service in Venezuela with the Shell Petroleum Company, Limited.

ORDERS WORTH £135,000 have been placed by the Aluminium Company of Canada, Limited, with Stordy Engineering, Limited, thermal and mechanical engineers, of Wolverhampton. They are for two batch annealing furnaces and ancillary equipment worth £45,000, and homogenizing furnaces, loading bogeys, and bogey haulage gear worth £90,000.

FOUR THREE-TIER GR-S synthetic rubber dryers are to be supplied by John Dalglish & Sons, Limited, Glasgow, to a new factory, near Rio de Janeiro, of Petrobras, the State-controlled enterprise. Two similar dryers have been ordered by the Standard-Vacuum Oil Company, of New York, for a new refinery near Melbourne. The orders are valued at £350,000.

CONTRACT FOR THE supply to the Suez Canal Authority of about 21,000 tons of Larssen steel piles worth about £1,000,000 has been secured by the South Durham Steel & Iron Company, Limited, Middlesbrough. This tonnage represents the largest single contract for interlocking steelpiling ever placed in the United Kingdom. Shipment is to be completed by October, 1961.

AUTOMATIC TANK GAUGES for installation on 38 tanks at the new Slagen Refinery for Esso Reffineriet, Norway, are to be supplied by Firth Cleveland Instruments, Limited, of Pontypridd, a member of the Firth Cleveland group. The British company has also assembled a complete control console to house three remote reading receivers, Gilbarco bulk meters, and their associated printers.

MAIN PUMPHOUSE MACHINERY for the foul water portion of the new Bristol drainage scheme is to be supplied by W. H. Allen Sons & Company, Limited, Bedford. The contract which is subject to Ministry approval, is worth £138,962. Six 33-in. vertical-spindle suspended mixed-flow pumps driven by four Allen constant-speed and two Laurence Scott & Electromotors, Limited, variable-speed A.C. motors, will be supplied.

BRITISH TRANSPORT COMMISSION has placed a contract for the largest travelling breakdown cranes to be used in the UK with Cowans Sheldon & Company, Limited, Carlisle. Including all associated equipment, the order is worth about £750,000. Twelve of the cranes are of a new 75-ton type for use on main lines and 10 are for lifting up to 30 tons on both main and branch lines. First deliveries are expected towards the end of the year.

Mr. Latham Reports Progress at Llanwern

FILLING operations at the site of the Spencer Steelworks now being built for Richard Thomas & Baldwins, Limited, at Llanwern were expected to be completed by the end of the summer, said Mr. G. H. Latham, deputy chairman of the company, when he addressed Newport Rotary Club. This side of the operation had been made difficult by the starting date for the works being brought forward by 18 months.

"We had originally intended to pump sand from the seashore, which is the modern method of preparing foundations, but because of the time factor we had to abandon that procedure and substitute at considerable heavier cost the filling of the site with enormous quantities of shale and other hardcore," he explained. Mr. Latham said that about 2,500,000 tons of shale had so far been dumped out of a total of 4,000,000 tons which was required.

Dealing with the steel industry generally, Mr. Latham outlined its growth in Britain from 10,000,000 tons a year in 1937 to 20,000,000 tons last year and a target of 25,000,000 tons this year. They were now just embarking upon the latest five-year plan, which committed them to spend a further £100,000,000 a year for the next five years. That was roughly £2,000,000 a week.

"Last year we had quite a serious recession, but this year we are in top gear, producing every ounce of steel we can make and having no difficulty at all in disposing of it, not only in this country but also oversea," he added. "We are still competitive in price with any country in the world. If we are satisfied that the demand for steel for the next five years will still show an upsurge, that must be sufficient justification for putting down in Llanwern an ultra-modern integrated steelworks," he said.

In Parliament

Fixed Price Coal Agreements Disapproved

DISCUSSIONS are taking place with the authorities in Belgium and Federal Germany for improved facilities to import United Kingdom coal, said MR. JOHN RODGERS, Parliamentary Secretary to the Board of Trade. But, in reply to MR. JAMES BOYDEN (Lab.), he said that as a matter of commercial policy inter-Governmental arrangements to share markets or fix prices with Poland, or any other country, were not favoured. "Such agreements are not in our general interest as an exporting country," he said. Mr. Boyden had asked for the problem of coal exports by agreement with Poland and also exports to Scandinavia to be tackled much more energetically.

MR. JAMES GRIFFITHS (Lab.) suggested that "what happened in the 1930's is happening again in the 1960's," and that Polish coal was being dumped at less than cost. Was it being said that the Government is having no discussions with the Polish Government about that situation?

MR. RODGERS: "I have already said that discussions with various Governments are taking place."

DECLINE OF COLLIER FLEET

REFERENCE to the serious decline of the collier fleet on the north-east coast was made by MR. WILL OWEN (Lab. & Co-op.). He asked what the Government would do to find work for displaced people. "This problem is a reflection of the general contraction in the coal-mining industry," he said. "The collier fleet has declined by 75 vessels over recent years and members are seeking on-shore employment."

MR. JOHN RODGERS, Parliamentary Secretary to the Board of Trade, said that the department would continue to encourage industrial development in places where unemployment justified it. Replying to MR. HILARY MARQUAND (Lab.), MR. RODGERS agreed to consider the problem of Middlesbrough seamen as well as of those farther up the coast.

MINING SUBSIDENCE

AMOUNTS paid by the Ministry of Power to the National Coal Board for subsidence were given by MR. J. C. GEORGE, Parliamentary Secretary to the Ministry, in a written reply to MR. ELFED DAVIES (Lab.). These ranged from a maximum of £500,000 in 1951-52 to a minimum of £100,000 in the following financial year. The total for the period 1951-58 was £1,860,000.

MR. GEORGE said that separate figures for Glamorgan, for which MR. DAVIES had asked, were not readily available. Relevant expenditure by the NCB in the South-Western Division was £697,854 out of a total of £4,337,167 for all divisions. On this proportion, grants for the division during the period would represent about £300,000, said MR. GEORGE.

CALL-UP OF APPRENTICES

CALL-UP for National Service of two apprentices jeopardized the production programme of Newcast Foundries, Limited, Newcastle-under-Lyme, said MR. STEPHEN SWINGLER (Lab.). He suggested that strong representations should be made to the Minister of Labour to do something to stop the call-up of an apprentice on the completion of his apprenticeship if it interfered with important production.

MR. JOHN RODGERS, Parliamentary Secretary to the Board of Trade, said that the writer of a letter from the firm had been informed that the release of soldiers was a matter for the Secretary of State for War. He added that the National Service of the two men concerned was deferred. When the deferment ended, they joined the Army in April last year and last January respectively. The general arguments in the letter had not convinced the President of the Board of Trade, he said, that there was any need to interview the Secretary of State or the Minister of Labour.

UNSOLD STOCKS of coal held by the National Coal Board at April 23 totalled 32,700,000 tons, including about 300,000 tons of East Midlands doubles, said the Minister of Power in a written reply to Mr. George Jeger (Lab.).

FCI Profit Aided by Sale of Steel Shares

ACCOUNTS of the Finance Corporation for Industry for the year to March 31, 1960, show how much is owed to last year's General Election and the accompanying boom in the market for steel shares. There is a profit, before tax, of £3,810,710, compared with a previous loss of £2,196,190, but the profit derives mainly from the sale in December of 2,000,000 ordinary shares acquired in the South Durham Steel & Iron Company, Limited, under the terms of the FCI loan agreement with the company.

The previous year's loss was mainly due to the provision of £2,550,000 against loans for which the year's entry is "nil." After taxation, eased by about £1,500,000 relief for previous losses, and the carry-forward adjustments, there is £1,290,591 available, against the previous loss of something over £2,000,000.

The chairman, Lord Weeks, states that bearing in mind the purpose for which the Bank of England in the previous year paid £5,000,000 in advance of calls, £1,000,000 (nil) has been put to general reserve. Of the balance, £18,375 goes in a 6 per cent. dividend, the first since 6 per cent. in 1957.

Coil Spring Research Liaison

FIRST industrial liaison officer of the Coil Spring Federation Research Organization is Mr. Henry Snow, a 42-year-old metallurgist. His job will be to improve the lines of communication between the laboratory and the factories, and he will be "selling" research not only to the spring-making industry itself but to all the user industries which are members of the organization. His campaign will be backed by a research programme, directed by Mr. R. Haynes, at the Sheffield laboratories.

Members are being introduced to Mr. Snow at the organization's annual conference which opened in Llandudno yesterday (Thursday). A record attendance was expected at the conference which includes a technical session at which new research results will be presented.

Coalfield News

TOTAL OUTPUT of the West Midlands Divisional Coal Board for the four weeks ended April 30, was 1,097,000 tons. Since the Easter holiday this year fell during the period this figure is 269,000 tons, or 10.6 per cent., below the total for the corresponding period last year.

CHURCH GRESLEY COLLIERY WELFARE BAND won third place in the Leicester area brass band competition held on Saturday. Mr. G. W. Hesp, conductor of the band of Ransome & Marles Bearing Company, Limited, conducted the colliery band at the contest. It will now compete in the national brass band finals to be held next October.

IMPROVED PRODUCTIVITY is maintained in the Durham Division of the National Coal Board. Overall productivity in the first 17 weeks of the year averaged 22.02 cwt. per manshift, against 21.59 cwt. in the corresponding period of last year. At the face, productivity reached 64.84 cwt. per manshift against 62.75 cwt. a year ago.

WINNER OF THE Scottish Divisional Coal Board's senior ambulance competition in Glasgow on Saturday was Auchincruive 4-7 Colliery of the West Ayr Area. Second and third were Bowhill No. 1 Colliery (West Fife Area) and Burghlee Colliery (Lothians Area). Auchincruive will compete in the national finals at Blackpool on June 11.

LITTLE DALQUHARRAN COLLIERY (Ayr) has been almost at a standstill for three days because 80 key faceworkers were called to give evidence at the trial of a former workmate. The average daily output of 300 tons was considerably reduced and meetings between the management and the NUM were held to sort out the problem.

IN THE St. John Ambulance Brigade regional adult ambulance and nursing competition finals, held at Bilborough (Yorks) on Saturday, Hucknall Colliery, representing Nottinghamshire, won the nursing section and the Harvey Reeve Shield. In the ambulance section the Rolls-Royce, Limited, team, representing Derbyshire, was first with Snibston Colliery for Leicestershire and Rutland second, and Hucknall Colliery fourth.

ACCIDENT which occurred at West Woodland Colliery (Co. Durham) 12 years ago was the cause of death of Mr. John Thomas Coates (56), an inquest jury decided at Cockfield on Friday of last week. There was no record of the accident because the pit closed some months later and records were destroyed. Two miners, Mr. John Brunskill and Mr. Leonard Thompson, said that Mr. Coates was crushed by tubs at the colliery and was off work for five weeks in 1948. A verdict of Accidental Death was returned.

Crawley Firm Celebrates Golden Jubilee

GOLDEN jubilee anniversary will be celebrated on June 10 by the Crawley (Sussex) firm, the A.P.V. Company, Limited, makers of process plant for the dairy, brewery, food, chemical, and related industries. The company was started in Wandsworth, London, by Dr. Richard Seligman as the Aluminium Plant & Vessel Company, Limited, to develop commercially a patent for the welding of aluminium.

Today, the company employs nearly 2,000 people at Crawley. It has created an oversea organisation based on eight associated companies, four of them with their own factories.

Coal Stocks Position

DETAILS of coal stocks as at April 30, 1960, compared with those available at May 2, 1959, are given in the appended table issued by the Ministry of Power.

Figures in parentheses, mainly calculated on the basis of requirements during the winter, indicate the total weeks which the tonnage in stock would last.

Week ended:—	April 30, 1960.	May 2, 1959.
	Thous. tons.	Thous. tons.
Distributed stocks—		
Public-utility undertakings—		
Gas	1,830 (3.6)	2,270 (4.2)
Electricity	4,958 (4.3)	6,070 (5.8)
Railways	355 (1.7)	559 (2.6)
Coke ovens	1,520 (3.0)	1,373 (2.6)
Industrial consumers—*		
Iron and steel	207 (1.8)	213 (1.9)
Engineering and other metal industries	257 (2.9)	286 (3.2)
Other industries	1,714 (3.0)	1,817 (3.2)
TOTAL INDUSTRIES	2,178	2,316
Merchants' stocks—		
(*a*) House coal	439	486
(*b*) Anthracite and boiler fuel	125	109
Miscellaneous (estimated)	250	343
TOTAL DISTRIBUTED STOCKS	11,655	13,526
Undistributed stocks—		
At collieries (on ground and in wagons)	26,603	17,650
At open-cast sites	6,428	5,952
TOTAL UNDISTRIBUTED STOCKS	33,031	23,602

* Excluding stocks held by the smaller consumers of less than 1,000 tons per annum.

Durham Division First-aid Contest

ANNUAL first aid competition of the Durham Divisional Coal Board is to be held in Durham City Technical College tomorrow (Saturday). Mr. N. F. Nattrass, industrial relations director of the Division, will preside and the awards will be presented by the county commissioners of the St. John Ambulance Brigade, Dr. R. Rutherford. Last year the Brancepeth Colliery teams won the senior and ancillaries section and Thrislington Colliery won the junior section.

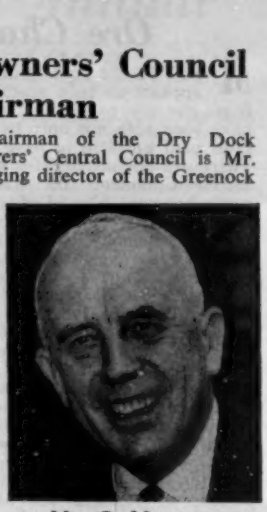
Teams from the following collieries will compete tomorrow:—Senior section: Dean & Chapter, Eppleton, Brancepeth, Crookhall, Shotton and Washington "F". Junior section: Crookhall, Wingate, Chester Moor, Thrislington, Elemore and Wearmouth. Ancillaries section: Tursdale Central Workshops, Norwood Coke Works, Stella Gill Coke Works, and Brancepeth Coke Works.

MINERS AT Sutton Manor Colliery, St. Helens, have complained they do not have enough elbow room in the snooker room of their welfare club. So three walls of the building which cost £54,000 to build only a year ago, are to be pulled down and rebuilt at a cost of at least £2,000.

Personal

Dry Dock Owners' Council Chairman

NEWLY-ELECTED chairman of the Dry Dock Owners' and Repairers' Central Council is Mr. GEORGE MORRISON, managing director of the Greenock Dockyard Company, Limited. Mr. Morrison, served his apprenticeship with the Fairfield Shipbuilding & Engineering Company, Limited, of Glasgow.



MR. G. MORRISON

He also served with the Northumberland Shipbuilding Company, Limited, and with Scotts' Shipbuilding & Engineering Company, Limited, Greenock, where he became shipyard manager. In 1947, he was appointed general manager of Greenock Dockyard Company and the following year became managing director. He is a member of the council of the Institution of Engineers and Shipbuilders in Scotland, a past chairman of the Clyde Shiprepairers' Association, and a past president of the Greenock Association of Engineers and Shipbuilders.

Mr. E. J. HUNTER, chairman of Swan, Hunter, & Wigham Richardson, Limited, Wallsend-on-Tyne, was elected senior vice-chairman of the council, and Mr. RICHARD HILL, a director of Charles Hill & Sons, Limited, Bristol, was elected junior vice-chairman.

Mr. J. DUNN has been elected secretary of the Kent district of the National Union of Mineworkers, and in consequence becomes a member of the national executive.

Cllr. J. M. ODDIE, a director of Robert Hudson, Limited, engineers, etc., of Leeds, left on Monday on a business trip around the world. He will visit India, New Zealand, and America.

Cmndr. S. DICKINSON, formerly head of the department of engineering at Wakefield Technical College, has been appointed advisor on technical education to the Federal Government of Nigeria.

Miss M. O. MORRIS, secretary and a director of T. Williams (Drop Forgings & Tools), Limited, Birmingham, has been installed as president of the Soroptimist Club of Central Birmingham.

Mr. JONATHAN W. ORD, personnel manager at the Sunderland shipyard of Short Bros., Limited, has received a presentation to mark the completion of 50 years' service with the company. Before taking up his present appointment in 1945, Mr. Ord was yard manager.

Mr. W. H. DYMOND has retired as departmental secretary of the Marketing Department of the South-Western Divisional Coal Board. Before nationalization, Mr. Dymond was commercial sales manager of Fernhill Collieries, Limited. He is succeeded by Mr. ERIC B. THOMAS.

Mr. W. BRINING has been elected president of the Aluminium Development Association for 1960-61. On the ADA council he represents the Almin, Limited, group of companies, which he joined as secretary in 1945 of which he became a director in 1952. The retiring president, Mr. R. HAHN, who represents the Association of Light Alloy Refiners & Smelters, Limited, on the ADA council, has been elected vice-president for the ensuing year.

Mr. W. E. WARD, director and general manager of the Consett Iron Company, Limited, has been elected chairman of the Wear District Advisory Committee of the Northern Regional Board for Industry. Mr. J. W. LOUGHRAM, district secretary of the AEU, has been elected vice-chairman.

Director of the Monotype Corporation, Limited, Mr. J. MATSON, has been re-elected chairman of the Association of British Manufacturers of Printing Machinery. Mr. CLARENCE A. AINSWORTH, a director of Linotype & Machinery, Limited, has been elected vice-chairman of the association.

Sir EDWIN HERBERT has been appointed president of the Electrical Development Association for 1960-61, in succession to Sir Josiah Eccles. Sir Edwin, a past president of the Law Society, is deputy chairman of the Imperial Continental Gas Association, and a director of Electronic Trust, Limited, and many other companies.

First chairman of the newly-formed Dudley District Engineering Industries Committee is Mr. P. D. K. FAZACKERLEY, of the Old Park Engineering Company, Limited. The committee has been formed to assist local firms to increase and improve the training of engineering apprentices. Cllr. C. A. OWENS, of the National Union of Sheet Metal Workers and Braziers, is vice-chairman.

Mr. ARTHUR SYKES, technical consultant to the David Brown Group, has been awarded the first gold medal of the British Gear Manufacturers' Association, in recognition of his outstanding work on behalf of the association. Mr. Sykes, who is 72, first joined the company in 1905, and prior to his present appointment had successively served as chief engineer, works manager, and engineering controller.

New president of the Jones & Laughlin Steel Corporation, Pittsburgh, is Mr. CHARLES M. BEEGHLY, an executive vice-president since 1958 and a director since 1957. Until he was elected executive vice-president, Mr. Beeghly was president of the corporation's strip steel division. Mr. AVERY C. ADAMS, who has served as chairman and president, will continue as chairman and chief executive officer.

Mr. GEORGE L. LYLE, formerly principal surveyor for Lloyd's Register at Liverpool, has been elected president of the Liverpool Marine Engineers' and Naval Architects' Guild. Mr. Lyle served his shipbuilding apprenticeship with Russell & Company (now Lithgows, Limited), at Port Glasgow and before joining Lloyd's Register had a wide experience in all branches of ship building and repairing in Clyde, Tyne, and foreign shipyards.

Deputy general manager of British Insulated Callender's Construction Company, Limited, since August, 1958, Mr. G. A. RENDLE has retired. Mr. Rendle joined Callender's Cable & Construction Company, Limited, in 1920 as contract engineer. He became deputy cable contracts manager of British Insulated Callender's Cables, Limited, in 1946, and three years later became cable contracts manager of the company from which he has retired.

Mr. L. HEDLEY HISCOTT, clerk to Maldon (Essex) Rural Council has been appointed a member of the Domestic Coal Consumers' Council.

In succession to Mr. Edward Lee, Mr. PETER HAWKSFIELD has been elected president of the Coal Merchants' Federation of Great Britain. Mr. Hawks-

field, who is 43, is managing director of the Associated Coal & Wharf Companies, Limited, group, and chairman of the South-eastern Regional Committee of the Coal Utilisation Council. Mr. W. T. MAINWARING-HUGHES becomes senior vice-president of the federation and Mr. PETER BREWIS has been elected junior vice-president.

Mr. JAMES B. BOYD, housing manager for the West Fife Area of the Scottish Divisional Coal Board, has retired. For eight years he was factor for the Lochgelly Iron & Coal Company, Limited, and before that he was factor for the estates in Glencraig and Saline of the Wilson & Clyde Coal Company, Limited. On vesting date he became sub-Area housing manager for Fife and Clackmannan and in the following year he was made Area housing manager. Mr. Boyd received a presentation to mark his 43 years' service to the industry.

Obituary

The death has occurred of Mr. COLIN NIGHTINGALE, foreman of the National Coal Board's central workshops at Rockingham (Yorks). He was 64.

The death has occurred of Mr. ROBERT PERCY VARTY, formerly manager of the ship chartering and brokerage department of Weidner, Hopkins & Company, Newcastle-upon-Tyne. He retired seven years ago.

The death has occurred of Mr. GEORGE FREDERICK HARDWICK, managing director of G. F. Hardwick, Limited, automobile and agricultural electrical engineers, of Waterdale, Doncaster. He was 57. Mr. Hardwick founded the business in 1936.

Mr. W. M. GRAINGER, director and secretary of Walter Somers, Limited, heavy steel forgers, etc., of Birmingham, has died. He joined the company as assistant secretary in 1946 and was made secretary and a director last year. He was also a director of the subsidiary, Walter Somers (Materials Handling), Limited.

Mr. P. R. LE MARE, a former chairman of Rickett, Cockerell & Company, Limited, coal distributors, etc., of London, E.C.3, died on Sunday, at the age of 86. Chairman from 1936 to 1945, he retired from the board in 1954 after 62 years' service with the company. He was the first vice-chairman of the Railborne Coal Factors' and Wholesale Merchants' Association.

Darwins Group's Late Improvement

FINANCIAL results of Darwins Group, Limited, Sheffield, for 1959, were better than could have been expected during the earlier part of the year, reports the chairman, Mr. F. Thompson-Schwab. "Although it was late in the year before any real improvement was manifest," he goes on, "we were ready to meet the demands arising from the changed circumstances."

All companies in the group are fully employed. "Heavy demands, however, bring problems and there is intense competition for the available supplies of raw materials, particularly steel scrap which is a vital part of our needs."

Net profit after tax was £180,371 (£113,364). A final dividend of 8½ (6) per cent. is recommended, making 12½ per cent. for the year.

CONCRETE, LIMITED—Mr. F. A. Birtles, general manager of the Midlands division, has been appointed to the board.

Ore Chartering

MARKETS are holding and from time to time there appears to be a scarcity of really prompt ships from any one particular loading area so that owners have been able not only to maintain the last basis of rates paid but also to have made some improvement. There is a fair demand for tonnage to load from India to the Continent and Marmagoa/Antwerp-Hamburg range has paid 52s. 6d., f.i.o., for 9,000 tons, May 10 to 31, and to Poland 58s. for 9,500 tons end April with option of Bombay loading at 35s. less.

As far as North Africa is concerned, there is a moderate inquiry for continental discharge but little business has been reported as tonnage does not offer freely. Porto Marghera to Holland paid 28s. 6d. on gross terms for 4,300 tons of residues for May 12 to 30 and from West Africa, Konakri/Poland fixed a 15,000 tonner for May at 28s. 9d., f.i.o. Bayonne/Sas van Ghent fixed 2,100 tons of sulphur for May loading at 19s., f.i.o., and 850 tons to Carrickfergus for early loading at 33s. with gross discharge.

Although there is some interest by phosphate charterers from Casablanca to this side, little has recently been fixed, but on the other hand a fair volume of tonnage has been taken up for China. May 11,000 tons obtained 60s. 6d., f.i.o., and trimmed to South China, but subsequently two large vessels, also May, were fixed basis not north of Shanghai at 62s. 6d. and a 14,000 tonner, May 23 to June 10, also secured this rate. The pyrites market is quiet.

Progress on Kariba Power Scheme

SECOND of the six 100 mW generators to be supplied by Associated Electrical Industries (Rugby), Limited, to the Kariba hydro-electric station in Northern Rhodesia, has now been commissioned. The Kariba power scheme is to be opened by Queen Elizabeth the Queen Mother on Tuesday.

The first generator, and equipment at three 330 kV substations, began to supply electric power to the Northern Rhodesian Copperbelt last December. Two more substations, Norton and Salisbury, have been commissioned to coincide with the coming into load of the second generator. Originally the six generators were to be commissioned at the rate of two a year, but now three will go into service this year, two in 1961, and the last in 1962.

AEI switchgear division has already sent all materials for the Kariba switching station and substations. Nineteen of the 25 330 kV lenticular tank oil circuit breakers have already been sent.

The full scheme involves the harnessing of the Zambesi River in the Kariba Gorge to provide electric power to an immense area in Central Africa.

Warwickshire Miners' Convalescent Home

SINCE the opening in October, 1947, of the Warwickshire Miners' Convalescent Home, at Swanage, a total of 8,721 patients have been admitted, says the annual report of the home. Last year, ordinary patients admitted numbered 553 and miner pensioners admitted totalled 326.

Expenditure during the year was £23,282 and the average weekly cost of each patient was £13 8s. 6d.

Colliery Annual Holidays

COMMENCING dates on which collieries will take their annual holidays during 1960 are listed below. The total holiday period is two weeks and, except in the North-Eastern and East Midlands divisions, all collieries are taking these consecutively.

Scottish Division

AREA No. 1 (WEST FIFE): All collieries, July 18 and 25.
AREA No. 2 (LOTHIANS): All collieries, July 4 and 11.
AREA No. 3 (CENTRAL WEST): All collieries (except Argyll), July 18 and 25. Argyll, August 8 and 15.
AREA No. 4 (CENTRAL EAST): All collieries, July 18 and 25.
AREA No. 5 (WEST AYR): Auchincruive Nos. 1, 2 & 3, Killoch (closed), Sundrum, Beoch Nos. 3 & 4, Pennyvenie No. 4, Minnivey, Houldsworth, Pennyvenie Nos. 2, 3 & 7, Dalquharran, Killochan, Littlemill Nos. 2, 3 & 5, Maxwell, Polquhairn, and Auchincruive Nos. 4 & 5, July 18 and 25. Blair Nos. 11 & 12, Lochlea, Mauchline, and Sorn, August 1 and 8.
AREA No. 6 (ALLOA): Bannockburn, Manor Powis, Pirnhall, Polmaise Nos. 3 & 4, Kinneil, Herbertshire (ceased production), and Plean, July 18 and 25. Bogside, Brucefield, Dollar (Devon), Glenochil, Harviestoun, and Zetland, August 1 and 8.
AREA No. 7 (EAST FIFE): All collieries, July 18 and 25.
AREA No. 8 (EAST AYR): Barony, Cairnhill, Highhouse, Whitehill Nos. 1 & 2, and Nos. 3 & 4, July 11 and 18. Auchlochan, Auchmeddon, Auldton, Douglas, Westoun, Bank, Bridgend, Coalburn, Knockshinnoch Castle, Glentaggart, Kames, and Kennox & Glespin, July 18 and 25. Fauldhead, Rig, Roger, and Gateside & Tower, July 25 and August 1.

Northern (N & C) Division

AREA No. 1 (SOUTH NORTHUMBERLAND): Bardon Mill, Burradon, Callerton, East Walbottle (including Prestwick), Havannah, Hazlerigg, Longbridge, Morwood, North Walbottle, Weetslade, and West Wylam, July 4 and 11. Backworth (Algernon, Eccles, Fenwick, and Maude), and Wallsend (Rising Sun), August 1 and 8.
AREA No. 2 (CENTRAL NORTHUMBERLAND): Brenkley, Dinnington, Dudley, Hartford, Seaton Burn, Seaton Delaval, and Seghill, June 20 and 27. Barmoor, Bedlington "A," "D," "E," and "F," Choppington "A" and "B," Horton Grange, and Netherton, July 4 and 11. Bates, Cambois, Isabella, Mill, and North Seaton, August 1 and 8.
AREA No. 3 (NORTH NORTHUMBERLAND): Broomhill, Hauxley, Pegswood, Shilbottle, Stobswood, and Whittle, June 20 and 27. Ashington, Ellington, Linton, Longhurst, Lynemouth, Newbiggin, and Woodhorn, July 18 and 25.
AREA No. 4 (CUMBERLAND): Clifton (ceased production), Risehow, St. Helen's, and Walkmill, July 25 and August 1. Haig, Harrington 10 and 11, and Solway, August 1 and 8.

Durham Division

AREA No. 1 (NORTH EAST DURHAM): Boldon, Harton, Hylton, Wearmouth, Westoe, and Whitburn, July 4 and 11. Heworth, Ryhope, Usworth, Wardley, Washington "F," and Washington Glebe, August 15 and 22.
AREA No. 2 (MID EAST DURHAM): Dawdon, Elemore, Eppleton, Hawthorn, Murton, Seaham, South Hetton, and Vane Tempest, July 18 and 25. Harraton, Herrington, Houghton, Lambton "D," Lumley 6th, Rainton (Adventure), and Silksworth, August 1 and 8.
AREA No. 3 (SOUTH EAST DURHAM): Deaf Hill, Easington, Sherburn Hill, Shotton, Thornley, Wheatley Hill, and Wingate Grange, August 1 and 8. Blackhall and Horden, August 15 and 22.
AREA No. 4 (SOUTH WEST DURHAM): Brusselton, East Hetton, Esperley Lane Drift, Fishburn, Haggs Lane, New Shildon, North Tees, Moorhill Drift, Randolph, Staindrop Field House Drift, Trimdon Grange, and West Auckland Drift, July 4 and 11. Bowburn, Metal Bridge, Thrislington, Tudhoe Mill Drift, Tudhoe Park, and Whitworth Park, July 18 and 25. Chilton, Dean and Chapter, Eldon Drift, Mainsforth, Midridge Drift and Westerton Drift, August 15 and 22.
AREA No. 5 (MID WEST DURHAM): Bearpark, Esh, Kimblesworth, Langley Park, Malton, Ushaw Moor, and Waterhouses, July 4 and 11. Beamish Mary, Beamish Second and Park Drift, Chester South Moor, Handen Hold, Nettleworth Drift, Pelton, Sacriston, South Pelaw, and Witton, July 18 and 25. Brancepeth, Brandon "C," Hole-in-the-Wall, Pit House, Roddymoor, Stanley Cottage Drift, West Thornley, and Tanners Hall, August 1 and 8.
AREA No. 6 (NORTH WEST DURHAM): Bradley Drift, Crookhall, Derwent, Eden, Hamsterley, Medomsley, and South Medomsley, July 4 and 11. Craghead (Busty), Fenhall Drift, Lanchester Towneley Drift, and Morrison Busty (including Louisa), July 18 and 25. Addison, Barlow Towney Drift, Chopwell/Wittonstall, Clara Vale, East Towniey, Emma, Garesfield, Greenside, Phoenix Drift, Stanley Burn Drift, Stargate, and Victoria Garesfield, August 1 and 8. Barcus Close, Blackburn Fell Drift, Burnopfield, Byermoor, Clockburn Drift, East Tanfield, High Marley Hill Drift, Kibblesworth, Marley Hill, Ravensworth Ann, Ravensworth Park Drift, Ravensworth Shop, South Garesfield (closed February 12, 1960), Tanfield Lea, and Watergate, August 15 and 22.

North Eastern Division

AREA No. 1 (WORKSOP): Brookhouse and Treeton, July 18 and 25. Dinnington, Firbeck, Handsworth (including Nunnery), Kiveton Park, Maltby, Manton, Orgreave, Shireoaks, Steetley, and Thurcroft, July 25 and August 1.
AREA No. 2 (DONCASTER): Bentley, June 20 and September 5. Bullcroft, Highgate, Yorkshire Main, and Central Workshops, June 27 and September 5. Askern, Brodsworth, Hickleton, and Rossington, July 4 and September 5. Hatfield, July 18 and 25. Goldthorpe, Markham, and Thorne, July 25 and September 5.
AREA No. 3 (ROTHERHAM): Cortonwood, June 6 and August 22. Aldwarke, July 4 and September 5. Elsecar, Kilnhurst, and Manvers, July 18 and 25. Cadeby, Denaby, and Silverwood, July 25 and August 1. Barnburgh and Wath, July 25 and September 5. New Stubbin, August 15 and 22.
AREA No. 4 (CARLTON): Ferrymoor, June 6 and July 25. Grimethorpe and Houghton, June 6 and August 22. Hemsworth and South Kirkby, June 6 and September 5. Frickley and South Elmsall, June 20 and September 5. Dearne Valley, July 11 and September 5. New Monckton Nos. 1, 2 & 6, and New Monckton Nos. 3 & 4, July 18 and 25. Upton, August 1 and 8. Darfield & Mitchells, August 15 and 22.
AREA No. 5 (SOUTH BARNSLEY): Barnsley, Barrow, Monk Bretton, and Wombwell, June 6 and August 22. Wentworth Silkstone, July 4 and August 22. Wharncliffe Silkstone, July 4 and September 5. Rockingham, July 18 and 25. Barley Hall, Grange, and Smithywood, July 25 and September 5. Dodworth and Silkstone Common, August 15 and 22.
AREA No. 6 (NORTH BARNSLEY): Bullcliffe Wood, Emley Moor, Howroyd, Lepton Edge, and Park Mill, June 6 and August 8. Woolley Edge, June 20 and August 8. North Gawber and Wharncliffe Woodmoor Nos. 4 & 5, June 27 and August 22. Crigglestone, July 25 and August 1. Hartley Bank, August 1 and 8. Caphouse, Denby Grange, Grange Ash, Gregory Spring, Newmillerdam, and Shuttle Eye, August 8 and 15. Haigh, Wharncliffe Woodmoor Nos. 1, 2 & 3, and Woolley, August 15 and 22.
AREA No. 7 (WAKEFIELD): Nostell and Shawcross, July 25 and August 1. Thornhill, July 25 and September 5. East Ardsley, Lofthouse, Middleton Broom, Rothwell, Sharlston, and Walton, August 1 and 8. Manor, Old Roundwood, Park Hill, and St. Johns, August 1 and September 5. Gomersal, August 8 and 15.
AREA No. 8 (CASTLEFORD): Ledston Luck, Peckfield, and Prince of Wales, July 25 and August 1. Ackton Hall, Allerton Bywater, Fryston, Glass Houghton, Wheldale, Newmarket Silkstone, Snydale, Waterloo, Walter Haigh, West Riding, and Primrose Hill, August 1 and 8. Savile, and Whitwood, August 1 and September 5.

North Western Division

AREA No. 1 (MANCHESTER): Astley Green, Brackley, Bradford, Cleworth, Deane, Mosley Common 1, 2, 3 & 4, Nook, and Sandhole, June 27 and July 4. Agecroft, Newtown, and Wheatsheaf, July 25 and August 1.
AREA No. 2 (WIGAN): Bedford, Chanters, Gibfield, and Parsonage, June 27 and July 4. Albert, Bickenshaw, Chisnall Hall, Dairy, Giants Hall, Mains, Moss, Robin Hill, Standish Hall, and Wigan Junction, July 4 and 11. Ellerbeck, July 18 and 25.
AREA No. 3 (ST. HELENS): Landgate, Park, Parkside, and Sumersales, July 4 and 11. Golborne, Lyme, and Wood, July 18 and 25. Bold, Clock Face, Cronton, Lea Green, Ravenhead, and Sutton Manor, July 25 and August 1.
AREA No. 4 (BURNLEY): Bank Hall, Copy, Fence, Hapton Valley, Reedley, and Fir Trees, July 4 and 11. Hoddlesden and Thorny Bank, July 11 and 18. Huncoat, and Scaitcliffe, July 18 and 25. Deerplay, Grime Bridge, Hill Top, and Old Meadows, July 25 and August 1.
AREA No. 5 (NORTH WALES): All collieries, July 25 and August 1.

East Midlands Division

AREA No. 1 (CHESTERFIELD): Ireland, June 6 and July 25. Oxcroft, June 6 and August 1. Arkwright, June 20 and September 12. Creswell, July 11 and 18. Bolsover, July 11 and August 29. Ramcroft, July 18 and 25. Morton and Parkhouse, July 25 and August 29. Holmewood, July 25 and September 5. High Moor and Westthorpe, July 25 and September 12. Whitwell, Williamthorpe, and Grassmoor.

August 1 and 8. Langwith, August 15 and 22. Glapwell Nos. 1 and 3, August 22 and 29. Markham Nos. 1, 2 and 4, August 29 and September 5. Renishaw Park, September 5 and 12.

AREA No. 3 (EDWINSTOWE): Clipstone and Shirebrook, July 11 and 18. Bilsthorpe, Blidworth, Mansfield, Ollerton, Rufford, Sherwood, Thoresby, and Welbeck, July 18 and 25. Bevercotes, and Harworth, July 25 and August 1. Warsop, August 8 and 15.

AREA No. 4 (ALFRETON): Alfreton, June 13 and August 1. Swanwick and Wingfield Manor, June 13 and August 8. Annesley, Bentinck, Brookhill, and Langton, June 27 and September 5. "A" and "B" Winning, July 4 and August 15. Shirland, July 4 and September 12. Kirkby, July 11 and 18. Silverhill, July 18 and 25. Cotes Park, July 18 and August 29. Newstead, July 25 and August 1. Pleasley, August 8 and 15. New Hucknall, July 25 and September 5. Sutton, July 25 and September 12. Teversal, July 25 and September 19.

AREA No. 5 (ILKESTON): Denby Hall, June 6 and August 29. Lodge, Moorgreen, and Selston, June 13 and August 1. Coppice, Woodside Nos. 1, 2, and 3, June 20 and August 22. Denby, June 20 and August 29. New Langley and Ormonde, June 27 and July 4. Stanley, June 27 and August 8. Mapperley, June 27 and August 22. Cossall & Oakwood Grange, July 11 and August 29. Pye Hill & New Selston, August 1 and 8.

AREA No. 6 (NOTTINGHAM): Gedling, and Wollaton, July 18 and 25. Bestwood, Calverton, Clifton, and Workshops, July 25 and August 1. Linby, Radford, and Cotgrave, August 8 and 15. Babbington and Hucknall, August 15 and 22.

AREA No. 7 (SOUTH DERBYSHIRE AND LEICESTERSHIRE): All collieries, August 1 and 8.

West Midlands Division

AREA No. 1 (NORTH STAFFS): All collieries, August 1 and 8.
AREA No. 2 (CANNOCK CHASE): All collieries, July 25 and August 1.
AREA No. 3 (SOUTH STAFFS): All collieries, July 25 and August 1.
AREA No. 4 (WARWICKSHIRE): All collieries, July 25 and August 1.

South Western Division

AREA No. 1 (SWANSEA): All collieries, July 18 and 25.
AREA No. 2 (MAESTEG): All collieries, August 1 and 8.
AREA No. 3 (RHONDDA): All collieries, July 4 and 11.
AREA No. 4 (ABERDARE): Aberaman, Abercynon, Abergorki, Albion, Deep Duffryn, Deep Navigation, Fforchaman, Mardy, Merthyr Vale, Penrikyber, Rhigos, Taff Merthyr, Tower, Trelewis, and Tylorstown No. 9, August 1 and 8. Abergwm, Gwmgwrach, Pentreclwydau, and Rock, July 18 and 25.
AREA No. 5 (RHYMNEY): All collieries, July 4 and 11.
AREA No. 6 (MONMOUTHSHIRE): All collieries, July 18 and 25.
FOREST OF DEAN: All collieries, July 25 and August 1.
SOMERSET AND BRISTOL: All collieries, July 25 and August 1.
AREA No. 9 (NEATH): All collieries, July 18 and 25.

South Eastern Division

All collieries, July 25 and August 1.

Miners Will "Fight" for 30s.-a-week Rise

DRASTIC action may be taken by South Wales miners to win their claim for a 30s.-a-week rise, delegates to the annual conference of the South Wales Area of the National Union of Mineworkers were told at Porthcawl on Thursday of last week. Mr. Tom Evans, Area executive council member, said: "In the fight for wages miners have been moving backwards. We have reached the stage in our dealings with the National Coal Board where we do not get anything just for the asking.

"We have to fight. The only way we will get an increase is by the mass pressure of all the British miners," he declared. Mr. Evans said that since nationalization the union had received only half the amount of its wage claims. Another Area executive member, Mr. Ben Evans, added: "If this increase is not forthcoming, we should take far more drastic measures to secure a living wage for miners."

A 30s.-a-week rise would cost the board nearly £50,000,000 a year.

Coal Chartering

COAL markets are generally quiet and although there is still a good demand from Hampton Roads to Japan, only a moderate tonnage has been taken up. Large June to Japan obtained $8.60 whereas 7,500 tons to Osaka direct was fixed for May at 20 cents less. It is still possible to arrange contracts to Japanese destinations.

Relet tonnage has been taken from the Roads to Antwerp, Rotterdam, or Amsterdam, about 19,000 tons for May 18 to 31 at 25s., and subject to stem it would appear that charterers would be able to repeat, although, on the other hand, owners show no particular inclination to accept 25s. Hampton Roads/Bremen reports 27s. for 11,500 tons, May 23 to June 10. Business is quiet on South American account with Roads/Rio fixing 11,000 tons for June 1 to 15 at $5.25, and there is also some inquiry for the Lower Plate. Here again, tonnage could doubtless be fixed on contract basis from Roads to Rio. Hampton Roads/West Italy reports business at $4.70.

There is very little to report on chartering from the UK to usual destinations, but some inquiry is noted from east and west coasts to the Mediterranean. There is, however, a good demand from east coast on Scandinavian account.

Pit Ponies in the Transfer Market

FEARS that nine pit ponies at Brereton Colliery (Staffs) would be destroyed when the pit closes this summer have proved unfounded. Instead, they will be sent to other pits along with the miners there. Mr. Harold Rochell, who looks after the ponies, said they would first be sent to the National Coal Board pony farm at Rownsley and from there to other pits as required.

Mr. Rochell was injured in a pit accident seven years ago and took over the job of caring for the ponies, which were re-introduced to Brereton for the first time for 20 years for a new type of work—timber-dragging. Three of them have on different occasions recently been exhibited at the Royal Horse Show.

The ponies will not leave the pit until after most of the miners, as they will be needed for salvage work.

NCB "Float" Sinking Church

"WHATEVER may be said humorously about the National Coal Board, when they make up their minds to do a thing they do it." This note of praise for the NCB was sounded by the Rev. George Percival, chairman of Sheffield Methodist District, at the District Synod in Sheffield last week.

He was reporting on the action taken by the Board over the damage caused by subsidence to the Portland Street Church at Whitwell. Although categorically refusing to make any cash payment for the damage, it had started work on a plan to "float" the building on a concrete raft. "They have taken the place by storm, in fact the organ was demolished so that they could get at things," declared Rev. Percival.

CAPITAL of Union Minière du Haut Katanga, the Belgian Congo copper producer, is to be increased from 8,000,000,000 Congolese francs to 10,000,000,000 by an incorporation of reserves.

Board Changes

From Apprentice to Managing Director

APPOINTED managing director of DAVY & UNITED ROLL FOUNDRY, LIMITED, Sheffield, in succession to Mr. M. A. Fiennes, who remains chairman of the company, Mr. Herbert Henry Utley began his career as an engineering apprentice with the United Steel Companies, Limited, at its Rothervale works.

MR. H. H. UTLEY

In 1940 he became night superintendent of the Skinningrove Iron Company, Limited, of Saltburn-by-the-Sea, (Yorks), and five years later, Mr. Utley joined Dorman Long & Company, Limited, as assistant manager of its Cleveland works. He remained with Dorman Long until 1957, when he became director and general manager of Davy & United Roll Foundry.

He has been a member of the Iron and Steel Institute since 1941 and is an associate member of the Institution of Mechanical Engineers, a Fellow of the Institute of Fuel, and an associate member of the Institution of Metallurgists. He is a member of council of the Cleveland Scientific and Technical Institution, and a member of the council and a past-president of the Cleveland Institution of Engineers.

HALKYN DISTRICT UNITED MINES, LIMITED—Mr. G. W. Cradduck has been appointed a director. He will continue as general manager.

NISSEN STEELWORKS, LIMITED—Mr. R. Eliason, formerly an architect with Stevenage Development Corporation, has been appointed to the board.

THE MANGANESE BRONZE & BRASS COMPANY, LIMITED—Lt.-Col. S. J. M. Auld has resigned from the board of which he has been a member since 1946.

J. H. FENNER & COMPANY (HOLDINGS), LIMITED—Sir James Doak, who has been associated with the company's Indian enterprises for some years, has joined the board.

MODERN MACHINE TOOLS, LIMITED—Mr. Eric Greenwood, general manager of the company and of Precision Machinery Services, Limited, has been elected a director of both companies.

ENGLISH ELECTRIC COMPANY, LIMITED—Mr. H. J. H. Nethersole, general manager, has joined the boards of the subsidiaries, Vulcan Foundry, Limited, and Robert Stephenson & Hawthorns, Limited.

BROWN BAYLEY STEELS, LIMITED—Mr. J. S. Ridges, who has been with the company for many years, has retired from his executive capacity as commercial director but retains his seat on the board.

BRITISH BENZOL & COAL DISTILLATION, LIMITED—Mr. J. V. Drake has been appointed resident director. He has been with the company for many years, latterly as production manager and general manager.

TRIPLEX HOLDINGS, LIMITED—Mr. J. L. S. Steel has been elected to the board and appointed deputy-chairman. Mr. Steel recently retired from the board of Imperial Chemical Industries, Limited, after more than 37 years with the company.

HARGREAVES COAL & SHIPPING, LIMITED—Mr. W. Comben Longstaff has been appointed deputy chairman. and Mr. Ian N. N. Beadle managing director. Mr. Michael G. Locket sales manager, and Mr. Stanley Ingram, secretary, have joined the board.

NORTONS-TIVIDALE, LIMITED—Dr. P. J. van der Walt has joined the board. He was formerly assistant director of the Fuel Research Institute of South Africa and in 1958 he became joint managing director of Nortons-Tividale South Africa (Pty.), Limited.

JOHN BAKER & SONS, LIMITED—Mr. A. T. W. Baker has joined the board. He is a director of the parent company, International Combustion (Holdings), Limited, and managing director of Stokes, Taylor & Shaw, Limited, another member of the group.

ENGLISH ABRASIVES CORPORATION, LIMITED—Owing to a difference of opinion on the question of management of the company's business, Mr. G. R. Wolfe Barry, joint managing director, has ceased to be a director of the company, its subsidiaries, or associated companies. A payment has been made to him by way of agreed damages for breach of his contract.

MASSEY-FERGUSON (EXPORT), LIMITED—On medical advice, Mr. Arthur Whiteley, assistant managing director, is to retire in June on reaching his 60th birthday. He is to take up a number of consultant appointments. Mr. Whiteley joined Harry Ferguson, Limited, in 1948 as export manager. During the war he held an executive position with the Iron and Steel Control.

ALMIN, LIMITED—Following the acquisition by Imperial Chemical Industries, Limited, and Aluminium Company of America (ALCOA), the board has been reconstituted as follows: Dr. J. Taylor (chairman), Mr. DuBose Avery, Mr. W. Brining, Mr. J. M. Graham, Mr. F. Resch, Mr. F. B. H. Villiers, and Mr. S. W. Weysom. Dr. Taylor is a director of ICI and chairman of Imperial Aluminium, Limited, and Yorkshire Imperial Metals, Limited, other large associates of ICI in the non-ferrous metals field.

BARROW HAEMATITE STEEL COMPANY, LIMITED—Sir W. Hungerford Pollen, chairman of Burt Bros., Limited, and of Sheffield Steel Products, Limited, and its subsidiaries, has been appointed to the board. Other directors appointed are Mr. R. E. G. Windsor, chairman of R. H. Windsor (Holdings), Limited, and other companies in the group and a director of J. R. Collyear, Limited, Technical Machines & Accessories, Limited, and Webley & Scott, Limited, Mr. P. C. Windsor, director and general manager of R. H. Windsor, Limited, Mr. W. McCall Dodds, joint managing director of Smith, Patterson Company, Limited, and of Taylor Stoker Company, Limited, and Mr. R. D. Fox, a director of Arusha Industries, Limited.

Non-ferrous Metal Prices

(*Delivered, unless otherwise stated*)

Copper—Solid-drawn tubes, 2s. 5d. per lb.; rods, 266s. per cwt. basis; 20 s.w.g., 301s. per cwt.

Brass—Solid-drawn tubes, 2s. 0½d.; sheets up to 10 w.g., 218s. 3d. per cwt.; wire, 2s. 9¾d.; rolled metal, 218s. 3d. per cwt.

Lead Sheets, etc.—Sheets, £115 15s.; pipes, £118 per ton.

Zinc Sheets, etc.—Sheets, 15 g. and thicker, ex works, English destinations, £127 10s.; rolled zinc (boiler plates), ex works, all English destinations, £125 5s.; zinc oxide (Red Seal), d/d buyers' premises, £105 per ton.

Other Metals—Nickel, £600. Aluminium ingots, £186. Antimony, English, 99 per cent., £190. Quicksilver, ex warehouse, £71. Bismuth (per lb.), 16s. nom. (1-ton lots). Cadmium, 10s. 6d. per lb. Magnesium ingots (per lb.), 2s. 2¾d. to 2s. 3d., notched bar 2s. 9¼d.; powder 6s. 1d. Platinum, per oz. (troy), £30 5s.

NEWS IN BRIEF

SOLARTRON-JOHN BROWN AUTOMATION, LIMITED, has been registered with nominal capital of £100,000 in £1 shares (50,000 "A" ordinary and 50,000 ordinary).

MARKETING DIFFICULTIES have forced Arigna Collieries, Limited, in the Republic of Ireland, to stop production on one day a week. About 300 employees are affected.

SIX RUSSIAN mining subsidence engineers, on a visit to the UK, will visit Newcastle-upon-Tyne on May 24 to discuss mining subsidence with the King's College Mining Society and to exchange information on research work in this field.

KNIFE WHICH WAS USED to cut the cake at the royal wedding was made at 36 hours' notice by Trustwell Bros., Limited, Sheffield. The blade was hand forged from a block of stainless steel and a special ice saw incorporated.

OLD BIRLEY HALL, the 17th century building at Birley Edge which Daniel Doncaster & Sons, Limited, leased from Sheffield Corporation two years ago, has been completely restored by the firm. The Hall is to be used as part of the company's head office.

ALUMINIUM, LIMITED, is to expand its fabricating facilities in Colombia in partnership with Industrias Metalurgicas Unidas, SA, and other local capital. A new company, Alcan de Colombia, SA, is to be formed to build a new sheet rolling mill at Cali, Colombia.

PLANS FOR A TUNNEL under the Ruhr have been prepared by a West German engineer. It is claimed that the tunnel would solve the traffic problem of this overpopulated industrial and mining area and provide an atomic-bomb-proof shelter for its inhabitants in wartime.

STEEL PRODUCTION in Western Germany this year will probably reach 34,000,000 metric tons, according to the Bulletin for German Industry. It quoted Dr. H. G. Sohl, president of the Iron and Steel Association, as saying that the figure would be 15 per cent. up on last year.

BY THE CREATION of new Rs 5 shares, the authorized capital of the Indian subsidiary of Leyland Motors, Limited—Ashok Leyland, Limited—is to be increased from £2,000,000 to nearly £6,500,000. This increase is necessary to complete the current expansion programme.

ALUMINIUM PRODUCTION of the Norwegian company Mosjoeen Aluminium, is to be increased from 32,000 tons to 48,000 tons a year. The necessary investments of about £5,000,000 will be taken partly from the firm's own capital and partly from loans arranged in Norway.

DELEGATIONS AND representatives from over 45 countries visited the Fuel Efficiency and Power for Industry Exhibition which closed last Friday, at Olympia, London. They included visitors from Czechovakia, Germany, Holland, Belgium, Kuwait, Burma, Japan, Portugal, and the US.

ABOUT 200 EMPLOYEES at the Bracknell (Berks.) works of Sperry Gyroscope Company, Limited, the contractor responsible for the guidance system of Blue Streak rocket, are being dismissed on June 3. The redundancy arises from the Government's cancellation of the project. Six hundred employees have asked the management to withdraw the notices and are seeking an assurance that there should be no redundancy dismissals.

FIRST CONSIGNMENT of materials, mainly bricks, will arrive at the new permanent depot at Barry of Refractulation, Limited, of London, S.E.9, early next month. Most of the materials will initially be for development of the new Spencer works of Richard Thomas & Baldwins, Limited, at Llanwern (Mon.).

LICENSING AGREEMENT has been concluded between Glenfield & Kennedy, Limited, valve manufacturers and hydraulic engineers, of Kilmarnock, and Schmitz & Schulte, of Germany, for the supply of the latter company's diaphragm valves to UK and Commonwealth markets from Glenfield & Kennedy's works.

JOINT PROJECT aimed at developing aluminium production is to be launched by Kaiser Aluminium & Chemical Corporation, the United States concern, and Pechiney, the leading French producer. A new company—Cie Internationale pour la Fabrication de l'Aluminium Kaiser-Seichine (Cifakas)—is to be established.

BOARD OF TRADE has refused to permit the Daventry Engineering Company, Limited, manufacturers of diesel engine components and agricultural implements, of Daventry (Northants), to transfer its Birmingham works to Daventry. Negotiations for the transfer had been completed between the local council and the company.

CHARBONNAGES DE FRANCE—the French Coal Board—is to float a new 5 per cent. public loan for an unlimited amount on Monday. The loan can be subscribed either against cash or two bonds in exchange for three Charbonnages de France bonds 1952, of a nominal value of 100 new francs maturing next November.

FURTHER REDUCTIONS in the prices of hydrogen peroxide, ranging from between £5 and £10 a ton on 35 per cent. strength, are announced by Laporte Chemicals, Limited. The new prices come into effect this month and result from the successful working of the company's plants and the rising demand for hydrogen peroxide since the last reduction in January, 1959.

DESIGN OF THE miniature cupolas which have been constructed by apprentices at the Thorncliffe, near Sheffield, works of Newton, Chambers & Company, Limited, is to be copied at a technical institute in India. M. B. Morton, Newton Chambers' training officer, has sent copies of the original plans to Mr. V. P. Soni, principal of the N.R. Technical Institute, Charbagh, Lucknow.

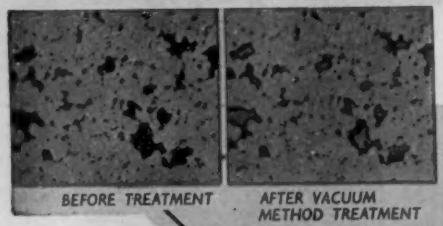
FIRST EXTENSION of the new factory of S. N. Bridges & Company, Limited, at Battersea, London, was opened on Tuesday by the chairman, Lord Aberconway. The company is a subsidiary of the John Brown group and manufactures Bridges power tools. The new site includes the Battersea Heliport and will have more than 600,000 sq. ft. of production space when completed.

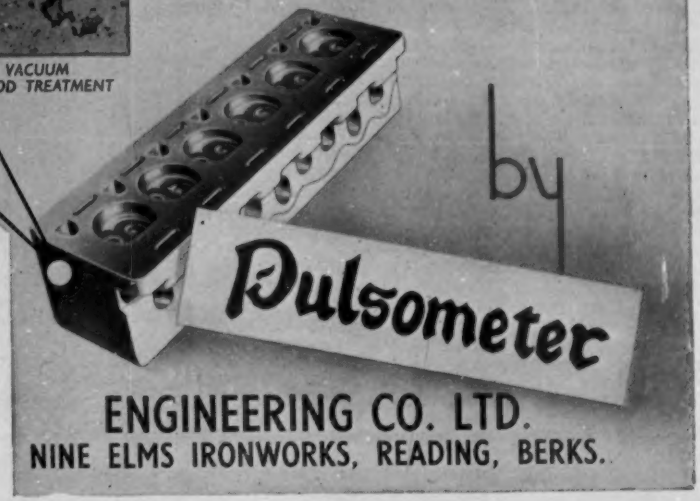
PROVIDED THAT THE merger becomes effective betwen Sanderson Bros. & Newbould, Limited, and Kayser, Ellison & Company, Limited both of Sheffield, Sanderson proposes to change its name to Sanderson Kayser, Limited. In the formal offer it is stated that Mr. L. A. K. Halcomb, Mr. H. Baron, and Mr. A. B. Heeley, directors of Kayser, Ellison, will be invited to join the Sanderson, Kayser board.

COUNCIL OF INDUSTRIAL DESIGN has selected a Coles Ranger truck-mounted crane, manufactured by Steels Engineering Products, Limited, Sunderland, a member of the Steel group of companies, for inclusion in the British Government exhibit at the Canadian National Exhibition, to be held in Toronto from August 24 to September 10. The exhibit, however, will be the

SEALING OF FERROUS & NON-FERROUS CASTINGS BY

Impregnation





by

Pulsometer

ENGINEERING CO. LTD.

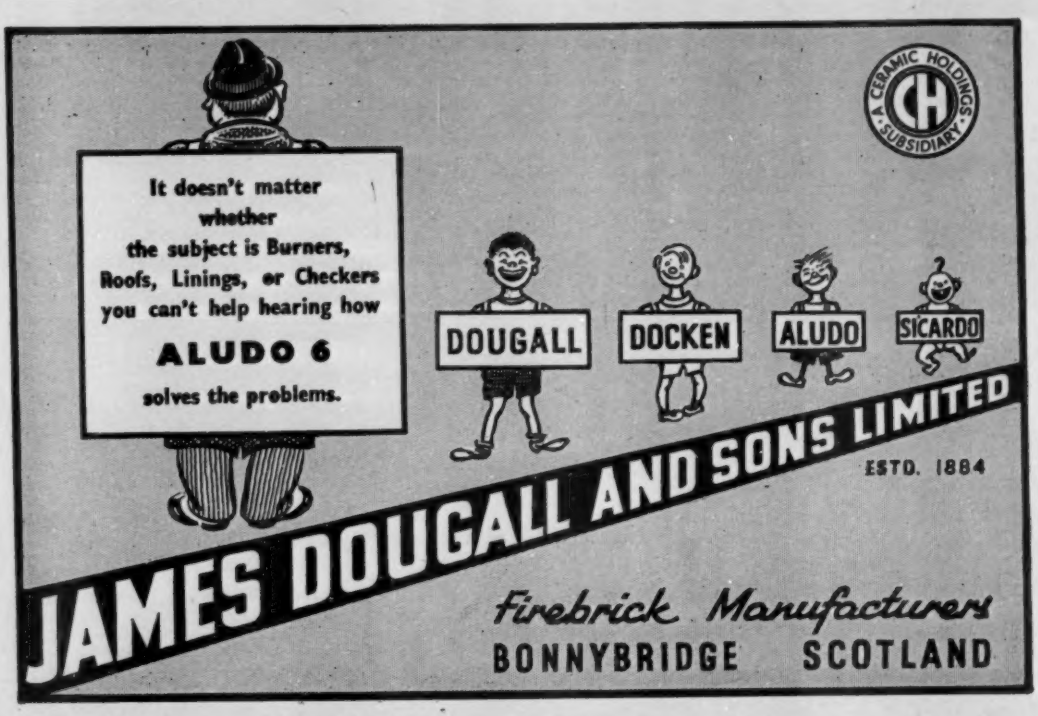
NINE ELMS IRONWORKS, READING, BERKS.

The Pulsometer Engineering Co. Ltd. have developed a vacuum method of impregnation which efficiently seals porous castings.

This process has been applied successfully to bronze, gunmetal, steel, aluminium and cast iron castings of all sizes at pressures up to 1,200 lb. per sq. in., thus saving production time, money and labour.

Vacuum Impregnation has been so perfected that castings can be sealed within 48 hours.

Descriptive details on request.



scale model of the crane, which was shown at the Mechanical Handling Exhibition at Olympia recently.

EXHIBITION OF THE winning and commended designs submitted in the Industrial Art Bursaries Competition organised by the Royal Society of Arts in 1959, will be held at the society's House in John Adam Street, Adelphi, London, W.C.2, from May 18 to June 3.

MR. J. H. BRADY has been appointed marketing manager of the No. 1 (North-East Durham) Area of the Durham Divisional Coal Board in succession to Mr. T. Dunn, who is to retire at the end of the month. Mr. Brady is 42 and has been marketing officer (operations) for the Durham Divisional Coal Board since 1957. Previously, he served as assistant Area marketing manager in the No. 5 (Mid-West Durham) Area.

SHORT-TIME working is to be introduced by the tractor makers, Massey-Ferguson, Limited, at its Coventry factory at the end of the month. Shop stewards have been told that 4,000 workers may have to lose a day or half a day a week for two or three months and that production will be cut from 300 to 260 tractors a day. Seasonal slackness and the tightening-up of hire purchase terms are the causes of the decision.

DURING THE SIX months to March 31, 1960, crude steel production of Phœnix-Rheinrohr, AG, of Düsseldorf, increased to 1,550,942 metric tons from 1,022,424 tons in the first six months of 1958-59. Sales volume during the period was $206,190,000 (DM 866,000,000) compared with $148,810,000 (DM 625,000,000). Export figures reached $54,520,000 (DM 229,000,000) against $37,380,000 (DM 157,000,000).

PLANS HAVE BEEN ANNOUNCED by the Chemetron Corporation of Chicago for the acquisition of Clyde Tube Forgings, Limited, Glasgow, makers of welding fittings, from Shaw-Petrie, Limited, pipework engineers, etc., of Glasgow. The terms of the transaction, which does not involve Shaw-Petrie's piping design and fabrication business, were not disclosed. No changes are expected in present operating personnel at the Clyde Tube Forgings' plant. Chemetron's tube turnings division will co-ordinate Clyde Tube Forgings operations with its own and Mr. W. G. Conner, Jnr., head of the division's international sales, will serve initially as managing director of Clyde Tube Forgings.

Ferro-alloy Prices

(Per ton, unless otherwise stated, delivered)

FERRO-SILICON (6-ton lots and over)—45 per cent. Si, £41 10s. to £44, scale 15s. per unit, lumpy; 75 per cent. Si, £57 to £62 10s., scale 15s. per unit, lumpy.

FERRO-VANADIUM—50/60 per cent., 22s. 6d. per lb. of V.

FERRO-MOLYBDENUM—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

CALCIUM MOLYBDATE—12s. 4d. per lb. of Mo.

MOLYBDIC OXIDE BRIQUETTES—11s. 10d. per lb. of Mo, delivered United Kingdom.

FERRO-BORON—23/25 per cent., 7s. 6d. per lb.

FERRO-TITANIUM—20/25 per cent., 2-3 per cent. Cu, £250; 38/40 per cent., commercially carbon-free, £287.

FERRO-TUNGSTEN—80/85 per cent., 11s. 6d. per lb. of W.

TUNGSTEN METAL POWDER—98/99 per cent., 14s. 6d. per lb. of W.

FERRO-CHROME (6-ton lots and over, lumpy)—4/6 per cent. C, £78 10s. to £82 10s., basis 60 per cent. Cr scale 26s. to 28s. 6d. per unit; over 6 per cent. C, £77 to £80 10s., basis 60 per cent. Cr. scale 26s. to 28s. 6d. per unit; max. 2 per cent. C*, 1s. 8d. to 1s. 11d. per lb. Cr; max. 1 per cent. C*, 1s. 8½d. to 1s. 11½d. per lb. Cr; max. 0.15 per cent. C*, 1s. 9½d. to 2s. 0½d. per lb. Cr; max. 0.10 per cent. C*, 1s. 9¾d. to 2s. 0¾d. per lb. Cr; max. 0.06 per cent. C*, 1s. 10¼d. to 2s. 1d. per lb. Cr.

METALLIC CHROMIUM—98/99 per cent., 6s. 10d. per lb.

METALLIC MANGANESE—94/96 per cent., carbon-free, £275; 96/98 per cent., £285.

FERRO-COLUMBIUM—65/67 per cent., Cb+Ta, 19s. 9d. per lb., Cb+Ta.

FERRO-MANGANESE (home)—78 per cent., £6 10s.

* *Average 68-70 per cent. Cr.*

World's Biggest Copper Rolling Mill Opened

WORLD'S biggest copper rod rolling mill was opened at Prescot (Lancs) on Tuesday by Mr. Reginald Maudling, President of the Board of Trade. The mill, which cost £1,500,000, is technologically the most advanced yet built and is operated by a crew of only 17 men. It is owned by British Insulated Callender's Cables, Limited, and was designed by BICC technicians and the Brightside Foundry & Engineering Company, Limited, of Sheffield.

MR. R. MAUDLING

With a daily capacity of 400 tons, the mill will supply more than 55 per cent. of the rod used by the cable-making industry in the UK. Its normal annual production will be 100,000 tons on the basis of two daily shifts of 8½ hours each. This output can be raised to 125,000 tons a year with overtime working.

The group now has four mills at Prescot and is at present using or selling about 90,000 tons of copper rod a year. In two years, this figure may have risen to 100,000 tons a year. The introduction of the new mill means that one of the other mills at Prescot producing 15 tons of coiled copper rod an hour, will close. The remaining two mills roll heavyweight bars for railway electrification contracts and aluminium rods.

In 90 seconds, the new mill reduces a copper wire bar 54 in. long and about 4 in. square to a coil 1,300 ft. long. It can roll a rod of various sizes between ¼ in. and $\frac{5}{16}$ in., and can produce rods of two different diameters at the same time. This double production line eliminates one disadvantage of the mill being replaced. There, if the size of the rod is changed, a day's output can be lost.

About half the copper rod made in Lancashire by the BICC group is used in the group's own factories; 40 per cent. is sold to other British cablemakers; and about 10 per cent. is exported to plants abroad.

During the opening ceremony, Mr. Maudling referred to the fact that the group sells its goods in 130 countries and manufactures in 11. It was encouraging to see what an immense amount of business the group did in the Commonwealth. He added that prospects for the cable industry must be bright because, as the economy of the world developed, and as many countries which had not up to now shared in prosperity started to catch up with our living standards, the demand for power transmission and communication equipment between countries must continue to grow.

MORE THAN 2,700 years of service were rewarded when 74 employees of Silvertown Rubber Company, Limited—a subsidiary of BTR Industries, Limited—received long service awards from the managing director, Dr. W. D. Scott, last Friday.

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